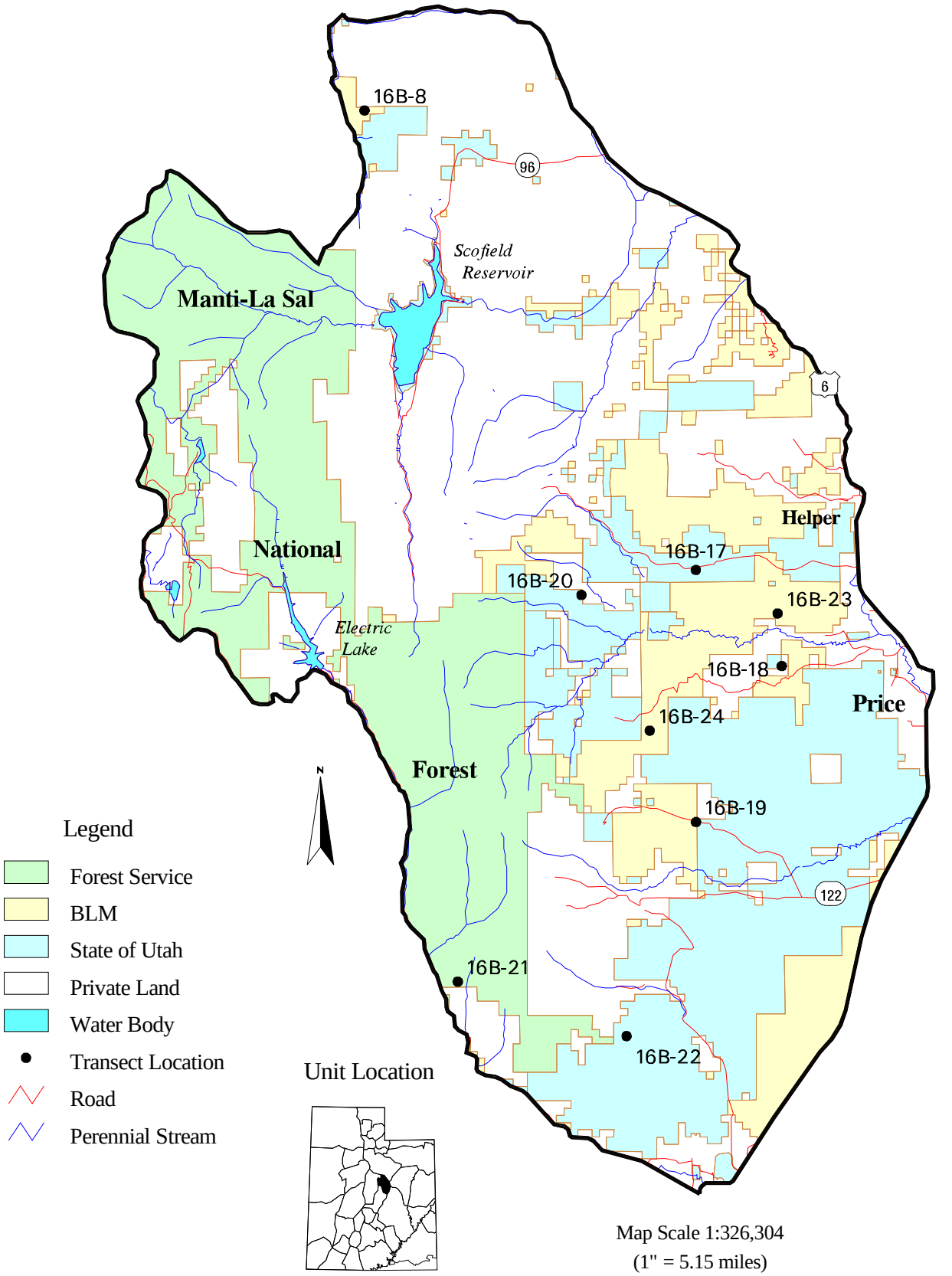
Management Unit 16B



Map Scale 1:326,304
(1" = 5.15 miles)

WILDLIFE MANAGEMENT UNIT 16B - MANTI-NEBO, MANTI NORTH

Boundary Description

Utah, Sanpete, Emery, and Carbon counties - Boundary begins at Highway SR-10 and Highway SR-31 in Huntington; then north on SR-10 to Highway US-6; northwest on US-6 to Highway US-89; south on US-89 to SR-31; southeast on SR-31 to Huntington.

This unit was previously called the Northeast Manti Deer Herd Unit 30. In the spring of 1998, this unit was incorporated into the much larger Wildlife Management Unit #16. This subunit (16B) encompasses the east and west sides of the Wasatch Plateau. Most of the winter range in subunit 16B lies on the east side of the Wasatch Plateau, which rises straight up from the valley floor to ridges with heights over 9,500 feet. The winter range is a narrow strip of land along the base of the plateau below the 8,000 foot contour. It runs from Price Canyon south to Huntington Canyon. Other important winter ranges include a large section of land along the Price River in the Colton area, below Scofield Reservoir and in the mouths of several side canyons in Huntington Canyon. Elk winter ranges are found on south-facing grassy points at high elevations on the Wasatch Plateau. These include Ford Ridge, Hardscrabble, and large points on the south side of Gentry Mountain overlooking Huntington Canyon.

Currently, 54% of the winter range in Wildlife Management Unit 16 is managed by the BLM and U.S. Forest Service. The remaining portion is primarily owned by private entities, with a small amount of acreage being owned by the DWR. Summer range is 72% Forest Service lands, 22% privately owned, with the remainder made up of state owned lands.

The Manti-North area has historically supported a variety of wildlife and outdoor recreation, livestock grazing, ranches and farms, energy developments, and some forest industry. Industrial activities on the deer herd unit are associated primarily with coal production, electrical power generation, and oil and gas development. Exploration and development activities for oil and gas have the potential for future increases. Add to this a growing demand for low-sulfur Wasatch coal, and one can begin to visualize the demands placed upon winter ranges in this area.

Power plants, slack piles, coal load-out facilities, ghost towns, railroads, and agriculture compete for valuable winter range property. The Huntington Canyon Power Plant alone has removed over 400 acres of critical winter range. An extensive road system provides year-round access to large portions of the winter range. Heavily used access roads to coal mines dissect important winter ranges all along the east side of the Wasatch Plateau and are accountable for significant highway deer mortality.

Herd Unit Management Objectives

There are no current specific management objectives for subunit 16B, but only unit wide objectives. The current target winter herd size for all of unit 16 is to achieve a target population size of 60,600 (38,000 wintering deer on the Wasatch Plateau or Manti Mountain Portion of the unit and 22,600 on the Nebo portion). A post season buck to doe ration of 15:100 is sought with 30% of these bucks being 3 point or better.

Key Areas

Key wintering areas for deer include Wildcat Canyon and the Gordon Creek basin, Consumers Bench, Porphyry Bench, North Spring, several areas in Huntington Canyon, Gentry Mountain, and Spring Canyon drainages. Preferred elk wintering areas include Miles Point, Reynolds Point on Trail Mountain, Telephone Bench, and Diamanti Bench.

The winter range is made up of several habitat types which include pinyon-juniper, sagebrush/grass, mountain brush, grassland, seedings, and other miscellaneous vegetation types. Pinyon-juniper woodland is the most widespread type, accounting for 40 percent of the total winter range. Unfortunately, it is also among the least productive according to the 1980 range inventory. Sagebrush grass communities make up approximately 24 percent of the winter range and probably receive the heaviest use due to the availability of preferred forage.

Eight interagency range trend studies were established in June and July of 1988. Six sites sample the big sagebrush/grass range type. One study is on a higher elevation, steep slope, dominated by perennial grass, and another is in a pinyon-juniper chaining. Two studies that were established in 1989 in the Starvation drainage in Spanish Fork Canyon are now included in subunit 16B. These studies sample a curlleaf mahogany area and an adjacent mountain brush site. Two additional studies were added in 1994. Both sites are on sagebrush-grass range, one on Consumer Bench, and the other on Wiregrass Bench. Six of the studies are on BLM land including Ford Ridge (#15), Hardscrabble (#16), North Springs Bench (#19), Poison Spring Bench (#22), Consumer Bench (#23) and Wiregrass Bench (#24). Five studies occur on State land including Starvation Mahogany (#8), Starvation Mountain Brush (#9), Slackpile (#17), Porphyry Bench (#18), and Telephone Bench (#20). One study, Huntington Canyon (#21), occurs on land administered by the U.S. Forest Service.

Grazing Summary

Most of the study sites in subunit 16B on which grazing occurs are on lands administered by the BLM. Ford Ridge is in the Price Canyon West allotment which is grazed by 92 cattle from May 17 to November 15. This sagebrush/grass ridge receives year-round elk use. Hardscrabble is in the Crandall Canyon allotment which is grazed from May 1 to October 31 by 31 cattle. It is an important site for elk in winter. North Spring Bench is in the allotment of the same name which is permitted for 1,000 sheep from May 1 to June 30. This study is on critical deer winter range. Poison Spring Bench is in the North Huntington cattle allotment is currently utilized by 354 cows in the spring (April 22 through June 26) and 282 cows in the winter (November 1 through December 15). The management plan outlines a two pasture deferred rotation system. The upper end of the allotment where the study is located was chained and seeded in the late 1960's. The Consumer Bench site is within the Consumer Wash allotment which is grazed by 54 sheep from October 1 to April 21, when an additional 821 sheep are allotted until June 20. Wiregrass Bench occurs in the Haley allotment which is grazed by 27 cattle from May 16 to October 31 in a two pasture deferred rotation.

The five trend studies on State land are not currently grazed by livestock. Slackpile is the only area where livestock grazing was permitted in the years immediately prior to study establishment. One hundred fifty AUM's (cattle) were allocated for use between May 15 and June 15, but grazing has since been discontinued. All areas receive heavy winter deer and elk use.

The remaining study, Huntington Canyon, is on U.S. Forest Service land. It occurs in the Gentry Mountain cattle allotment which is grazed by 1,440 cattle from June 27 through September 30. It is on a four pasture rest rotation schedule. This area contains important winter range for elk and portions of the southwest side of Gentry Mountain have been designated by the Forest Service in their Land and Resource Management Plan as "key big game winter range." This designation stipulates “the area must be available to big game and unencumbered each year during the critical winter period.”

These key areas and the study sites for this herd unit were discussed and selected during an Interagency meeting in Price on March 8, 1988.

Trend Study 16B-8-99

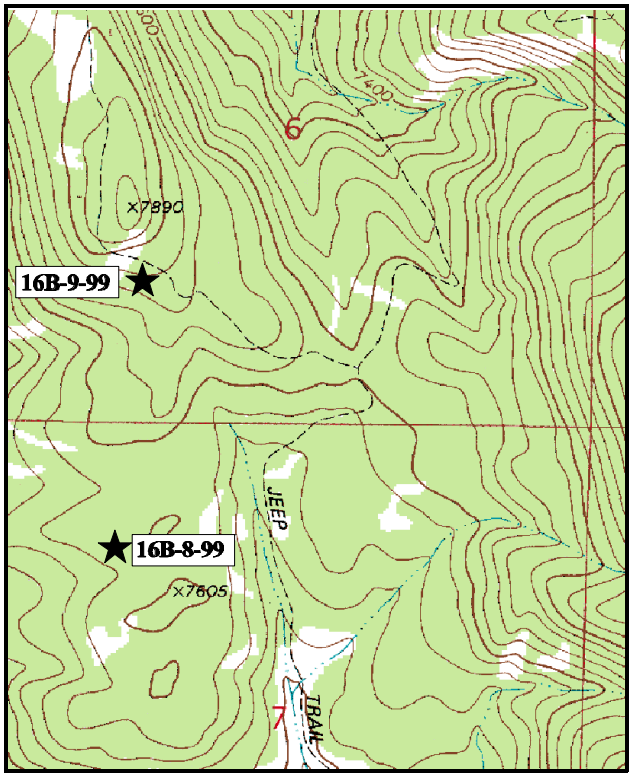
Study site name: Starvation Mahogany. Range type: Curlleaf Mountain Mahogany.

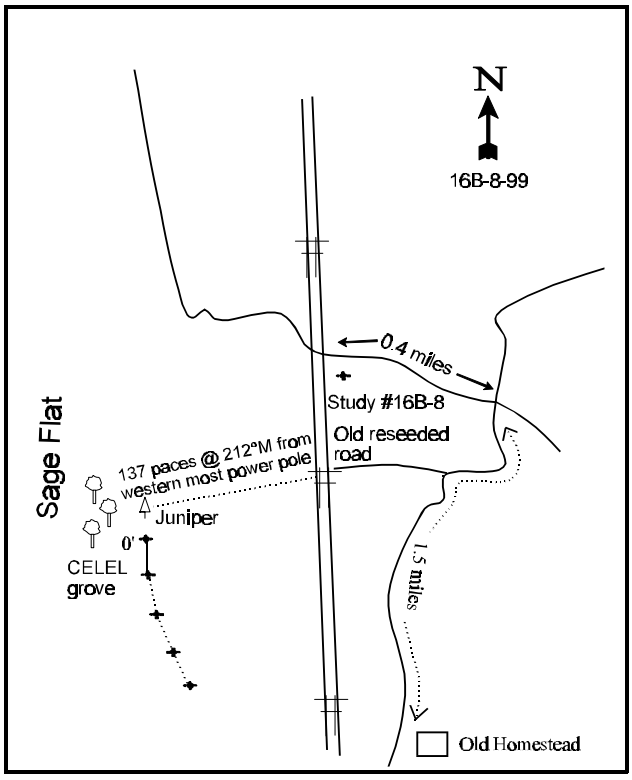
Compass bearing: frequency baseline 160°M- line 1; 151°M-lines 2-4.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1(11 and 95 ft), line 2(34 ft), line 3(59 ft), line 4(71ft).

LOCATION DESCRIPTION

From Tucker rest area on Highway 50/6 in Spanish Fork Canyon, take the Starvation Canyon road 4.6 miles. Turn left and go 0.5 miles to another fork. Turn left and go up a small canyon on a rough road for 1.15 miles to a fork. Turn left, cross the creek, and go 0.3 miles to an old homestead site. Continue up the road about a mile to an old road on the left that has been seeded over. From here, walk east to the double powerlines on the hill. From the western most pole, walk 137 paces at 212°M to the 0 ft stake of the baseline.





Map Name: Tucker Diagrammatic Sketch

Township 11S , Range 7E , Section 7 .

DISCUSSION

Trend Study Number 16B-8 (37-8)

This trend study is located on a curlleaf mountain mahogany bench in the Starvation Creek drainage on DWR property. It is important range for both mule deer and elk, with most use in the winter. The site lies on a gently sloping bench to the southwest at an elevation of 7,600 feet. Pellet group transect data from 1999 estimates moderate wildlife use with 34 deer days use/acre (84 ddu/ha) and 34 elk days use/acre (84 edu/ha). Livestock is currently light with an estimated 4 cow days use/acre (9 cdu/ha). A large 4-point buck antler shed was found while hiking to the site in 1999.

The soil is a dark brown clay loam with a slightly alkaline pH (7.4). The soil is moderately deep with an estimated effective rooting depth of nearly 14 inches. There is very little rock or pavement on the surface. There is a clay pan layer at 10-12 inches below the surface that is about 6 inches in thickness. The stoniness index estimated by pentrometer readings is more a reflection of this clay pan than from actual rock within the profile. Erosion is minimal with high vegetation and litter cover. Also, the majority of the roots from vegetation lie in the upper 12 inches of the profile helping to hold the soils in place. Organic matter is moderately high at 3.2%, while phosphorus levels are quite low (2.7 ppm). Phosphorus levels less than 10 ppm have been shown to limit normal plant growth and development.

The browse at the site are diverse with 13 species being sampled. Key species include: Utah serviceberry, mountain big sagebrush, true mountain mahogany, curlleaf mountain mahogany, and bitterbrush. These key species account for only 27% of the total browse cover, with the majority being provided by less preferred species such as snowberry, Gambel oak, and stickyleaf low rabbitbrush. This site was established in 1989 and not reread until 1999. The baseline was extended in 1999 accompanying the improvement in methods, which better estimates browse populations that have clumped and/or discontinuous distributions. The extension of the baseline and discontinuation of the relatively small density plots accounts for some of the big changes in population densities for many of the shrub species at the site. The population of serviceberry is currently estimated at 500 plants/acre. Biotic potential is good at 12%, with high recruitment from young plants (52%). Percent decadence has increased from 7% to 12% since 1989, with the proportion of plants in poor vigor increasing from 5% to 12% since the last reading. Currently, 28% of the plants display moderate use, with an additional 16% showing heavy use. Mountain big sagebrush currently numbers 940 plants/acre and occurs mostly in the more open areas. Decadency is high at 43%, with 11% of the population showing poor vigor. Recruitment is very low at 2%.

True mountain mahogany and curlleaf mahogany are currently estimated at 740 and 180 plants/acre respectively. Biotic potential and recruitment for true mountain mahogany are high at 14% and 57% respectively. No plants were classified as being decadent or displaying poor vigor in 1999. Currently, 30% of the plants sampled show moderate use, and 19% of the population shows heavy use which is relatively low for this species compared to other sites. Curlleaf mahogany has a high biotic potential at 33%, and extremely high recruitment from young plants at 67%. However, the low density accounts for these high percentages. Decadency is currently at 11%, with those plants showing poor vigor also at 11%. Mature curlleaf trees are about 7 feet tall, with many being highlined. Currently, the density of antelope bitterbrush is low at 120 plants/acre, with the majority being mature plants. Half of the plants sampled in 1999 displayed heavy use, although average crown measurements nearly doubled.

The most numerous browse at the site are the less preferred species. Snowberry is currently estimated at 3,120 plants/acre. Use is light and vigor good for this species. Gambel oak is found in thickets scattered throughout the site. This species is currently estimated at 1,980 stems/acre, and provides good cover for wildlife. Stickyleaf low rabbitbrush is the most numerous in density with an estimated 4,780 plants/acre in 1999.

The herbaceous understory is diverse in both grasses and forbs. Fourteen species of grasses and 28 species of forbs were sampled in 1989, while 13 species of grasses and 26 species of forbs were sampled in 1999. Two native species, bluebunch wheatgrass and western wheatgrass, are the most abundant grasses providing 58% of the grass cover. Western wheatgrass significantly increased in nested frequency between 1989 and 1999, with bluebunch wheatgrass slightly increasing, but not significantly. Hoods phlox is the most abundant forb occurring in 53% of the quadrats and providing 59% of the forb cover. No utilization was apparent on any of the herbaceous species when the site was read in September 1999.

APPARENT TREND ASSESSMENT

The high diversity would indicate a stable community, and considering the reproduction of desirable species, trend is stable to upward. Much of the curlleaf mountain mahogany is unavailable as forage, but provides good cover. Future overutilization of the browse component could result in higher decadence, unavailability of new production, and lower reproduction. Trend for soil is stable.

1999 TREND ASSESSMENT

Trend for soil remains stable. Protective ground cover provided by herbaceous vegetation and litter is high. Erosion is minimal with the gentle slope and the abundance of grasses and forbs. Trend for the key browse is stable overall. Biotic potential and recruitment is high for Utah serviceberry, true mountain mahogany, and curlleaf mountain mahogany. Percent decadency is also relatively low. These species all display evidence of moderate to heavy use. However, all these species are tolerant of higher levels of browsing and the current levels are not excessive. The main concern for the key browse on this site is the high decadency rate (43%) of mountain big sagebrush, and the number of dead plants (800 per acre). Although, mountain big sagebrush only makes up about 14% of the key preferred browse component (Utah serviceberry, true mountain mahogany, mountain mahogany, and bitterbrush). Herbaceous understory trend is stable. Sum of nested frequency for perennial grasses nearly doubled in 1999, while perennial forb sum of nested frequency decreased by 25%. Overall, the sum of nested frequency of all herbaceous perennial species remained nearly the same between 1989 and 1999.

TREND ASSESSMENT
soil - stable
browse - stable for the key species
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 8

Type	Species	Nested Frequency '89	Nested Frequency '99	Quadrat Frequency '89	Quadrat Frequency '99	Average Cover % '99
G	Agropyron cristatum	25	*9	11	3	.18
G	Agropyron smithii	59	*125	20	44	1.98
G	Agropyron spicatum	80	92	35	38	2.56
G	Agropyron trachycaulum	16	*-	7	-	-
G	Bromus inermis	-	2	-	1	.03
G	Carex spp.	9	6	4	3	.44
G	Koeleria cristata	4	12	2	6	.05
G	Oryzopsis hymenoides	11	*2	7	2	.06
G	Poa fendleriana	22	52	11	20	.69
G	Poa pratensis	4	*49	1	16	.88
G	Poa secunda	-	*11	-	6	.05
G	Sitanion hystrix	4	11	2	5	.10
G	Stipa comata	-	2	-	1	.00
G	Stipa lettermani	37	43	18	18	.79
Total for Annual Grasses		0	0	0	0	0
Total for Perennial Grasses		271	416	118	163	7.87
Total for Grasses		271	416	118	163	7.87
F	Achillea millefolium	6	3	2	1	.15
F	Antennaria rosea	-	4	-	1	.15
F	Arabis spp.	1	3	1	1	.00
F	Astragalus convallarius	26	23	13	12	.19
F	Astragalus miser	-	1	-	1	.03
F	Aster spp.	57	*16	23	5	.12
F	Astragalus spp.	9	9	6	3	.01
F	Calochortus nuttallii	-	1	-	1	.00
F	Chaenactis douglasii	9	2	6	2	.01
F	Cirsium spp.	30	*13	15	6	.05
F	Comandra pallida	20	15	7	6	.10
F	Draba spp. (a)	-	3	-	2	.01
F	Eriogonum umbellatum	20	12	12	7	.08
F	Gilia aggregata	3	-	1	-	-
F	Lomatium spp.	3	5	1	2	.33
F	Machaeranthera canescens	95	*42	45	18	.16
F	Orthocarpus spp. (a)	-	6	-	3	.04
F	Penstemon caespitosus	-	31	-	15	.46
F	Penstemon cyananthus	69	*7	31	3	.04
F	Penstemon humilis	31	*3	16	1	.00
F	Penstemon spp.	-	*58	-	28	1.00

Type	Species	Nested Frequency '89	'99	Quadrat Frequency '89	'99	Average Cover % '99
F	Phlox hoodii	154	129	62	53	4.45
F	Phlox longifolia	4	6	2	2	.01
F	Polygonum douglasii (a)	-	4	-	2	.01
F	Senecio multilobatus	8	*-	5	-	-
F	Solidago spp.	-	2	-	2	.03
F	Taraxacum officinale	-	*17	-	6	.03
F	Viguiera multiflora	1	3	1	1	.00
Total for Annual Forbs		0	13	0	7	0.06
Total for Perennial Forbs		546	405	249	177	7.47
Total for Forbs		546	418	249	184	7.54

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 8

Type	Species	Strip Frequency '99	Average Cover % '99
B	Amelanchier utahensis	21	.77
B	Artemisia tridentata vaseyana	34	.98
B	Cercocarpus ledifolius	8	.79
B	Cercocarpus montanus	24	3.63
B	Chrysothamnus depressus	2	.53
B	Chrysothamnus viscidiflorus viscidiflorus	62	3.77
B	Gutierrezia sarothrae	14	.45
B	Juniperus scopulorum	0	-
B	Mahonia repens	33	2.75
B	Opuntia fragilis	4	-
B	Pinus edulis	0	-
B	Purshia tridentata	6	1.23
B	Quercus gambelii	14	4.83
B	Symphoricarpos oreophilus	57	6.97
B	Tetradymia canescens	13	.33
Total for Browse		292	27.06

CANOPY COVER --
Herd unit 16B, Study no: 8

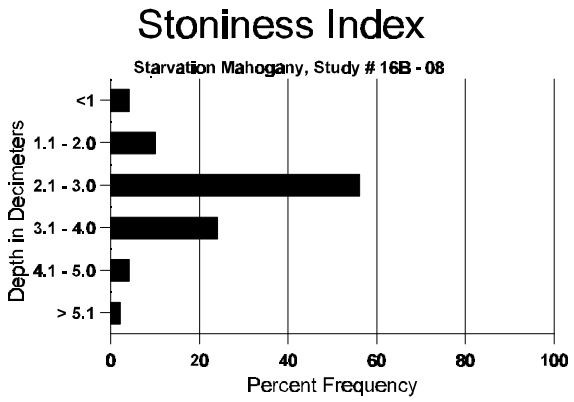
Species	Percent Cover '99
Cercocarpus ledifolius	8
Cercocarpus montanus	1
Quercus gambelii	7

BASIC COVER --
Herd unit 16B, Study no: 8

Cover Type	Nested Frequency '99	Average Cover % '89	'99
Vegetation	335	16.00	39.83
Rock	91	1.00	5.50
Pavement	109	.50	.72
Litter	369	64.75	50.79
Cryptogams	80	.75	3.12
Bare Ground	227	17.00	17.17

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 08, Study Name: Starvation Mahogany

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.9	46.2 (15.1)	7.4	36.7	28.7	34.6	3.2	2.7	156.8	0.7



PELLET GROUP FREQUENCY --
Herd unit 16B, Study no: 8

Type	Quadrat Frequency ⁉99	Pellet Transect Days Use/Acre (ha) ⁉99
Elk	24	34 (84)
Deer	20	34 (84)
Cattle	2	4 (10)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 8

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	89	2	-	-	1	-	-	-	-	-	3	-	-	-	200			3
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	89	22	4	-	6	-	-	4	-	-	24	11	1	-	2400			36
	99	11	-	-	2	-	-	-	-	-	12	-	1	-	260			13
M	89	-	-	-	-	-	-	2	-	-	2	-	-	-	133	31	18	2
	99	-	7	-	1	-	1	-	-	-	9	-	-	-	180	42	59	9
D	89	1	1	-	1	-	-	-	-	-	1	1	1	-	200			3
	99	-	-	2	-	-	-	-	-	1	1	-	-	2	60			3
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	12%	00%	05%	-82%
'99	28%	16%	12%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	2733	Dec:		7%
'99	500			12%

Artemisia tridentata vaseyana																		
Y	89	4	2	-	-	-	-	-	-	-	6	-	-	-	400			6
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66	18	22	1
	99	20	5	-	1	-	-	-	-	-	26	-	-	-	520	18	24	26
D	89	1	4	-	-	-	-	-	-	-	5	-	-	-	333			5
	99	10	5	3	2	-	-	-	-	-	15	-	-	5	400			20
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	58%	00%	00%	+15%
'99	21%	06%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	799	Dec:		42%
'99	940			43%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
S	89	12	2	-	2	-	-	2	-	-	18	-	-	-	1200			18
	99	2	-	-	-	-	-	1	-	-	3	-	-	-	60			3
Y	89	9	-	-	-	-	-	1	-	-	10	-	-	-	666			10
	99	4	1	-	-	-	1	-	-	-	6	-	-	-	120			6
M	89	-	-	-	-	-	-	-	6	-	6	-	-	-	400	235	146	6
	99	-	-	1	-	-	-	-	1	-	2	-	-	-	40	140	152	2
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	-	-	-	1	20			1
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-83%
'99	11%	33%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	1066	Dec:		0%
'99	180			11%

Cercocarpus montanus																		
S	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
Y	89	14	8	1	5	-	-	4	-	-	24	8	-	-	2133			32
	99	11	4	1	2	3	-	-	-	-	21	-	-	-	420			21
M	89	-	6	-	3	-	-	-	-	-	9	-	-	-	600	30	20	9
	99	2	2	3	1	2	3	3	-	-	16	-	-	-	320	38	40	16
D	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	36%	02%	00%	-74%
'99	30%	19%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	2799	Dec:		2%
'99	740			0%

Chrysothamnus depressus																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220	-	-	11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'99	220			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	89	60	-	-	-	-	-	-	-	-	60	-	-	-	4000			60
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	89	18	-	-	-	-	-	-	-	-	18	-	-	-	1200	11	12	18
	99	220	-	-	2	-	-	-	-	-	222	-	-	-	4440	12	15	222
D	89	6	-	-	-	-	-	-	-	-	5	-	-	1	400			6
	99	6	-	-	-	-	-	-	-	-	4	-	-	2	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	01%	-15%
'99	00%	00%	.83%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	5600	Dec:		7%
'99	4780			3%

Gutierrezia sarothrae																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
M	89	4	-	-	-	-	-	-	-	-	4	-	-	-	266	8	7	4
	99	37	2	-	-	-	-	-	-	-	39	-	-	-	780	6	12	39

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+61%
'99	04%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'89	399	Dec:	-
'99	1020		-

Juniperus scopulorum																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'89	0	Dec:	-
'99	0		-

Mahonia repens																		
S	89	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	99	5	-	-	3	-	-	-	-	-	8	-	-	-	160			8
Y	89	143	-	-	27	-	-	13	-	-	183	-	-	-	12200			183
	99	193	-	-	13	-	-	8	-	-	214	-	-	-	4280			214
M	89	27	-	-	-	-	-	-	-	-	27	-	-	-	1800	4	4	27
	99	225	-	-	15	-	-	41	-	-	276	5	-	-	5620	4	4	281

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-29%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'89	14000	Dec:	-
'99	9900		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia fragilis																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	9	3
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	14%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		0%
'99	140			14%

Pinus edulis																		
Y	89	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	100%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	66	Dec:		-
'99	0			-

Purshia tridentata																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
M	89	-	-	2	1	-	-	-	-	-	2	-	1	-	200	14	23	3
	99	1	2	-	-	-	-	-	-	1	4	-	-	-	80	17	44	4
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	67%	33%	-40%
'99	33%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	200	Dec:		0%
'99	120			17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	89	1	-	-	1	-	-	-	-	-	-	2	-	-	133			2
	99	7	-	-	9	-	-	9	-	-	25	-	-	-	500			25
Y	89	9	-	-	1	-	-	-	-	-	-	10	-	-	666			10
	99	29	-	-	17	-	-	7	-	-	53	-	-	-	1060			53
M	89	-	-	-	-	-	-	-	1	-	1	-	-	-	66	177	39	1
	99	32	-	-	5	-	-	-	7	-	37	7	-	-	880	86	38	44
D	89	6	-	-	-	-	-	-	-	-	-	6	-	-	400			6
	99	-	-	-	1	1	-	-	-	-	-	2	-	-	40			2
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+43%
'99	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	1132	Dec:		35%
'99	1980			2%

Symphoricarpos oreophilus																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	89	55	5	-	23	-	-	6	-	-	81	8	-	-	5933			89
	99	37	-	-	3	-	-	-	-	-	40	-	-	-	800			40
M	89	35	6	-	4	-	-	1	-	-	45	1	-	-	3066	17	20	46
	99	85	-	-	19	-	-	5	-	-	109	-	-	-	2180	17	38	109
D	89	15	5	-	4	-	-	-	-	-	23	-	-	1	1600			24
	99	7	-	-	-	-	-	-	-	-	5	-	-	2	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	10%	00%	.62%	-71%
'99	00%	00%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	10599	Dec:		15%
'99	3120			4%

Tetradymia canescens																		
Y	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133	16	12	2
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200	12	15	10
D	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-20%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	399	Dec:		33%
'99	320			19%

Trend Study 16B-9-99

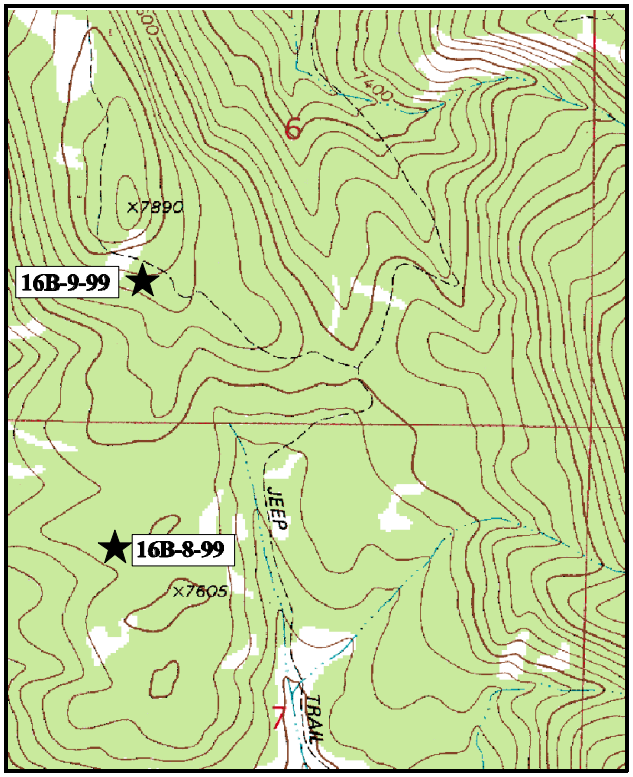
Study site name: Starvation Mountain Brush . Range type: Mixed Mountain Brush .

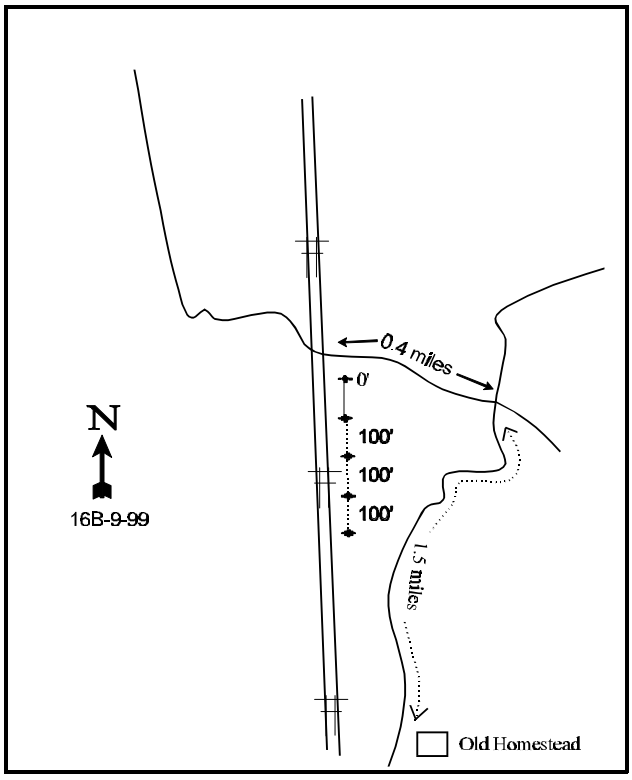
Compass bearing: frequency baseline 175°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1(11 and 95 ft), line 2(34 ft), line 3(59 ft), line 4(71ft).

LOCATION DESCRIPTION

From Tucker rest area on Highway 50/6 in Spanish Fork Canyon, take the Starvation Canyon road 4.6 miles. Turn left and go 0.5 miles to another fork. Turn left and go up a small canyon on a rough road for 1.15 miles to a fork. Turn left, cross the creek, and go 0.3 miles to an old homestead site. Continue on this road for 1.5 miles to a 4-way intersection. Turn left (west) and go 0.4 miles and park beneath the powerlines. The 0 ft stake of the baseline is 30 ft away from the road.





Map Name: Tucker

Diagrammatic Sketch

Township 11S , Range 7E , Section 6 .

UTM 4415366.072 N, 484114.098 E

DISCUSSION

Trend Study No. 16B-9 (37-9)

The Starvation Mountain Brush trend study samples a mixed mountain brush community in the Starvation Creek drainage on DWR property. The slope of the site averages 25% on a south facing aspect, and lies above the curlleaf mahogany bench sampled by trend study 16B-8. The elevation of the site is about 7,700 feet. The site was established in 1989 due to heavy use by wildlife. Use by big game remains quite high with an estimated 45 deer days use/acre (111 ddu/ha) and 64 elk days use/acre (159 edu/ha) in 1999. The surrounding area provides excellent thermal and escape for wildlife with large curlleaf mahogany thickets scattered in all directions. Several perennial water sources exist in the nearby area with the Spanish Fork River within a few miles to the north, Starvation Creek ½ mile to the west, and a spring 3/4 mile to the south.

The soil is a clay loam with a slightly alkaline pH (7.4). The profile is shallow and rocky with an estimated effective rooting depth of just over 12 inches. Organic matter is very high at 5.5%, while phosphorus levels (8.5) are lower than the minimum thought necessary for normal plant development and growth (10 ppm). Most of the bare areas are covered with rock and pavement. When coupled with the steep terrain, these rocky slopes tend to increase run-off, significantly reducing the amount of effective precipitation. Erosion potential is moderate to severe, especially during severe thunderstorms with the formation of rills and the movement of litter downslope. Abundant pedestaling and terracing is occurring on the steeper areas. This site was read following a period of heavy rains in September 1999. The well armored surface provided by rock and pavement limits erosion to minimal levels during most of the year.

Browse at the site is diverse with many key species present. The most important species include: Utah serviceberry, basin big sagebrush, mountain big sagebrush, true mountain mahogany, and antelope bitterbrush. These key species provide 47% of the total browse cover, and 37% of the total vegetative cover at the site. The sagebrush was classified only as basin big sagebrush (*Artemisia tridentata tridentata*) in 1989, but was split into basin big sagebrush and mountain big sagebrush (*Artemisia tridentata vaseyana*) in 1999. A large portion of those plants classified as basin big sagebrush in both 1989 and 1999 displayed moderate to heavy use, and most likely these plants are hybrids with the more palatable subspecies mountain big sagebrush. This much use would most likely not occur on basin big sagebrush, especially with the abundance of more preferred species on the site. Currently, the sagebrush population (both subspecies) is estimated at 1,660 plants/acre, a decrease from 2,666 plants/acre that were estimated in 1989. The extension of the baseline in 1999 accounts for most of the differences in browse densities. This much larger sample size better samples browse populations that have clumped and/or discontinuous distributions. Thirty-two percent and sixteen percent of the basin big sagebrush plants displayed moderate and heavy use respectively, while 55% of the mountain big sagebrush species showed moderate use. Poor vigor is currently noted on 11% of the basin big sagebrush plants and 5% of the mountain big sagebrush plants. Recruitment and biotic potential are low for both subspecies of sagebrush.

Serviceberry is currently estimated at 1,060 plants/acre, a decrease from the 1989 estimate of 4,733 plants/acre. The current age class distribution shows high recruitment (25%), 51% mature, and a 25% decadency rate. The main concern for this species is that 77% of the decadent plants are classified as dying, and 25% show poor vigor. Thirty-six percent of the population are currently classified as heavily utilized, although this is not excessive for this species which is tolerant to heavy browsing. In 1999, most of the leader growth on serviceberry is minimal (3-5 inches), with most being restricted to those stems which are protected and/or unavailable to browsing animals. True mountain mahogany is currently estimated at 1,120 mostly mature plants/acre. Heavy use on this species is high (55%), although it is also a species tolerant to heavy browsing. Nine percent of the population shows poor vigor. Bitterbrush currently numbers 540 plants/acre, with 81% of these being mature. Use is mostly moderate with only 15% of the population showing heavy use. Recruitment is good at 19%.

The herbaceous understory is dominated by perennial species. In all, 10 species of grasses and 16 species of forbs were sampled in 1999. The presence of seeded grasses indicates that some seeding was done in the area, probably to revegetate the power line corridor which runs directly through the area. Crested wheatgrass is the dominant species providing 71% of the grass cover, and 43% of the total herbaceous cover. Hoods phlox is the most abundant forb, and provides nearly half off the forb cover. All other species occur infrequently.

APPARENT TREND ASSESSMENT

The soil trend is downward on this site with the presence of active gullies and evidence of soil movement. Trend for browse and the herbaceous understory appears to be stable at the present time. However, continued heavy use coupled with drought may reverse this trend in the future.

1999 TREND ASSESSMENT

Trend for soil is slightly down with a decrease in litter cover, and an increase in bare ground. Soil movement is evident with pedestaling occurring around the base of most vegetation. The trend for the key browse is mixed. The most preferred species, serviceberry, true mountain mahogany, and bitterbrush show good recruitment from young plants. Use is moderate to heavy on these species, however, all are tolerant of heavy browsing. Biotic potential and recruitment for both subspecies of sagebrush is low. Basin big sagebrush (most likely a hybrid with mountain big sagebrush) shows moderate to heavy use on nearly half of the population, with mountain big sagebrush showing mostly moderate utilization (55%). Currently, 11% of the basin big sagebrush and 5% of the mountain big sagebrush plants show poor vigor. Overall, browse trend is stable. The herbaceous understory trend is up slightly. Sum of nested frequency for perennials increased, while annuals are a insignificant influence on the site currently.

TREND ASSESSMENT
soil - down slightly
browse - stable overall for the key species
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 9

Type	Species	Nested Frequency '89	'99	Quadrat Frequency '89	'99	Average Cover % '99
G	Agropyron cristatum	78	*168	32	58	4.31
G	Agropyron intermedium	6	8	2	4	.18
G	Agropyron spicatum	55	*25	21	13	.62
G	Bromus inermis	4	1	2	1	.00
G	Bromus tectorum (a)	-	23	-	9	.22
G	Carex spp.	-	3	-	1	.00
G	Oryzopsis hymenoides	-	3	-	1	.03
G	Poa fendleriana	26	18	13	9	.36
G	Poa pratensis	-	5	-	2	.30
G	Sitanion hystrix	21	4	7	4	.02
G	Stipa lettermani	1	-	1	-	-

Type	Species	Nested Frequency '89	'99	Quadrat Frequency '89	'99	Average Cover % '99
Total for Annual Grasses		0	23	0	9	0.21
Total for Perennial Grasses		191	235	78	93	5.85
Total for Grasses		191	258	78	102	6.07
F	Astragalus spp.	8	*-	3	-	-
F	Chaenactis douglasii	14	19	6	8	.07
F	Cirsium spp.	8	19	5	10	.08
F	Cryptantha spp.	-	*16	-	6	.45
F	Cynoglossum officinale	2	-	1	-	-
F	Eriogonum racemosum	1	1	1	1	.00
F	Eriogonum umbellatum	2	3	1	1	.03
F	Machaeranthera canescens	91	*21	40	11	.13
F	Microsteris gracilis (a)	-	1	-	1	.00
F	Penstemon caespitosus	-	1	-	1	.00
F	Penstemon cyananthus	30	31	17	17	.18
F	Penstemon humilis	11	*-	5	-	-
F	Penstemon spp.	14	*31	8	17	.85
F	Phlox hoodii	16	*81	7	36	1.89
F	Phlox longifolia	51	*7	27	3	.01
F	Streptanthus cordatus	4	4	2	2	.01
F	Taraxacum officinale	1	7	1	3	.04
F	Tragopogon dubius	-	3	-	1	.00
F	Verbascum thapsus	1	-	1	-	-
F	Viguiera multiflora	-	5	-	2	.06
Total for Annual Forbs		0	1	0	1	0.00
Total for Perennial Forbs		254	249	125	119	3.84
Total for Forbs		254	250	125	120	3.85

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 9

Type	Species	Strip Frequency '99	Average Cover % '99
B	Amelanchier utahensis	42	2.33
B	Artemisia tridentata tridentata	37	6.70
B	Artemisia tridentata vaseyana	14	.36
B	Cercocarpus montanus	46	4.28
B	Chrysothamnus depressus	2	-
B	Chrysothamnus viscidiflorus viscidiflorus	44	2.21
B	Cowania mexicana stansburiana	0	-
B	Juniperus osteosperma	0	1.23
B	Mahonia repens	7	.51
B	Opuntia spp.	1	.00
B	Purshia tridentata	19	3.33
B	Quercus gambelii	0	.00
B	Symphoricarpos oreophilus	91	14.12
B	Tetradymia canescens	20	1.09
Total for Browse		323	36.20

CANOPY COVER --
Herd unit 16B, Study no: 9

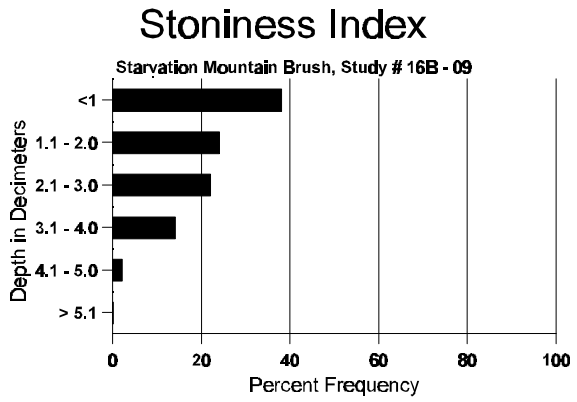
Species	Percent Cover '99
Amelanchier utahensis	.20
Artemisia tridentata tridentata	.20
Juniperus osteosperma	2

BASIC COVER --
Herd unit 16B, Study no: 9

Cover Type	Nested Frequency '99	Average Cover % '89	'99
Vegetation	309	12.50	41.06
Rock	150	12.00	6.14
Pavement	202	11.50	3.91
Litter	377	54.25	50.65
Cryptogams	63	.50	2.03
Bare Ground	246	4.00	18.73

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 09, Study Name: Starvation Mountain Brush

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.5	51.0 (13.3)	7.4	36.7	22.7	40.6	5.5	8.5	121.6	0.7



PELLET GROUP FREQUENCY --
Herd unit 16B, Study no: 9

Type	Quadrat Frequency ⁉99
Sheep	3
Rabbit	2
Elk	37
Deer	22

Pellet Transect Days Use/Acre (ha) ⁉99
5 (12)
n/a
64 (158)
45 (111)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 9

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	89	9	-	-	-	-	1	1	-	-	11	-	-	-	733			11
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	89	16	29	4	1	-	-	1	-	-	49	-	2	-	3400			51
	99	5	3	-	3	2	-	-	-	-	11	-	2	-	260			13
M	89	-	-	10	-	-	1	-	-	-	11	-	-	-	733	28	27	11
	99	-	3	9	3	6	6	-	-	-	26	-	1	-	540	24	23	27
D	89	-	-	9	-	-	-	-	-	-	9	-	-	-	600			9
	99	1	1	2	2	1	2	4	-	-	3	-	-	10	260			13
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	41%	34%	03%	-78%
'99	30%	36%	25%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	4733	Dec:	13%	
'99	1060		25%	

Artemisia tridentata tridentata																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	1	-	-	-	-	-	1	-	-	2	-	-	-	40			2
Y	89	8	-	1	-	-	-	-	-	-	9	-	-	-	600			9
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	89	2	7	8	-	-	-	-	-	-	17	-	-	-	1133	21	22	17
	99	19	18	5	-	-	-	1	-	-	43	-	-	-	860	28	33	43
D	89	1	3	10	-	-	-	-	-	-	14	-	-	-	933			14
	99	2	2	-	3	-	5	3	-	-	8	-	-	7	300			15
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	-	860			43

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	25%	48%	00%	-53%
'99	32%	16%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	2666	Dec:	35%	
'99	1260		24%	

Artemisia tridentata vaseyana																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	9	10	-	-	-	-	-	-	-	19	-	-	-	380	13	21	19
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	55%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:	0%	
'99	400		5%	

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	4	1	-	-	-	-	1	-	-	6	-	-	-	120			6
Y	89	-	1	-	-	-	-	1	-	-	2	-	-	-	133			2
	99	4	1	-	1	1	-	1	-	-	8	-	-	-	160			8
M	89	-	-	4	-	-	-	-	-	-	4	-	-	-	266	25	27	4
	99	-	5	5	-	9	22	-	-	-	34	5	2	-	820	32	33	41
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	4	3	-	-	4	-	-	3	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	17%	67%	00%	+64%
'99	29%	55%	09%	

Total Plants/Acre (excluding Dead & Seedlings)					
'89	399	Dec:	0%		
'99	1120		13%		

Chrysothamnus depressus																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140	-	-	7
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	13%	13%	

Total Plants/Acre (excluding Dead & Seedlings)			
'89	0	Dec:	0%
'99	160		13%

Chrysothamnus viscidiflorus viscidiflorus																		
Y	89	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	99	10	-	-	1	-	-	-	-	-	11	-	-	-	220			11
M	89	51	-	-	-	-	-	-	-	-	50	-	1	-	3400	12	15	51
	99	98	11	-	11	-	-	-	-	-	120	-	-	-	2400	8	14	120
D	89	5	-	-	-	-	-	1	-	-	6	-	-	-	400			6
	99	7	-	-	-	-	-	1	-	-	2	-	-	6	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	02%	-36%
'99	08%	00%	04%	

Total Plants/Acre (excluding Dead & Seedlings)			
'89	4333	Dec:	9%
'99	2780		6%

Cowania mexicana stansburiana																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	44	48	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'89	0	Dec:	-
'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	00%		00%		00%												
	'99	00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		-
													'99		0			-
Mahonia repens																		
Y	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	99	21	-	-	-	-	-	-	-	-	21	-	-	-	420			21
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	81	-	-	-	-	-	-	-	-	81	-	-	-	1620	2	5	81
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	00%		00%		00%									+90%			
	'99	00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		200	Dec:		-
													'99		2040			-
Opuntia spp.																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	21	1
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	00%		00%		00%												
	'99	00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		-
													'99		20			-
Purshia tridentata																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	99	2	2	-	1	-	-	-	-	-	5	-	-	-	100			5
M	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66	17	19	1
	99	3	10	3	-	5	1	-	-	-	22	-	-	-	440	23	51	22
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	50%		00%		00%									+76%			
	'99	63%		15%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		132	Dec:		-
													'99		540			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	00%		00%		00%												
	'99	00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		-
													'99		0			-
Symphoricarpos oreophilus																		
S	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	99	15	-	-	1	-	-	-	-	-	16	-	-	-	320			16
Y	89	22	1	-	-	-	-	-	-	-	22	-	1	-	1533			23
	99	66	-	-	3	-	-	1	-	-	69	-	1	-	1400			70
M	89	84	1	1	1	-	-	2	-	-	83	-	6	-	5933	16	21	89
	99	150	4	-	52	2	-	-	-	-	201	-	5	-	4160	19	33	208
D	89	10	3	-	-	-	-	-	-	-	7	-	3	3	866			13
	99	7	-	-	4	-	-	1	-	-	4	-	-	8	240			12
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	60			3
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	04%		.80%		10%									-30%			
	'99	02%		00%		05%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		8332	Dec:		10%
													'99		5800			4%
Tetradymia canescens																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	27	1	-	1	-	-	1	-	-	30	-	-	-	600	13	20	30
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	2	-	-	-	-	-	-	-	6	-	-	1	140			7
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'89	00%		00%		00%												
	'99	06%		00%		02%												
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		0%
													'99		960			15%

Trend Study 16B-15-99

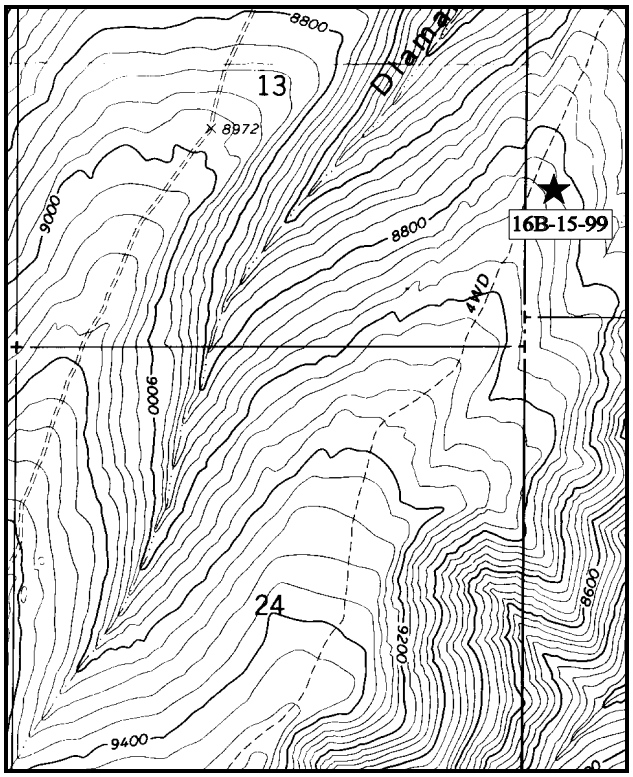
Study site name: Ford Ridge . Range type: Big Sagebrush - Grass .

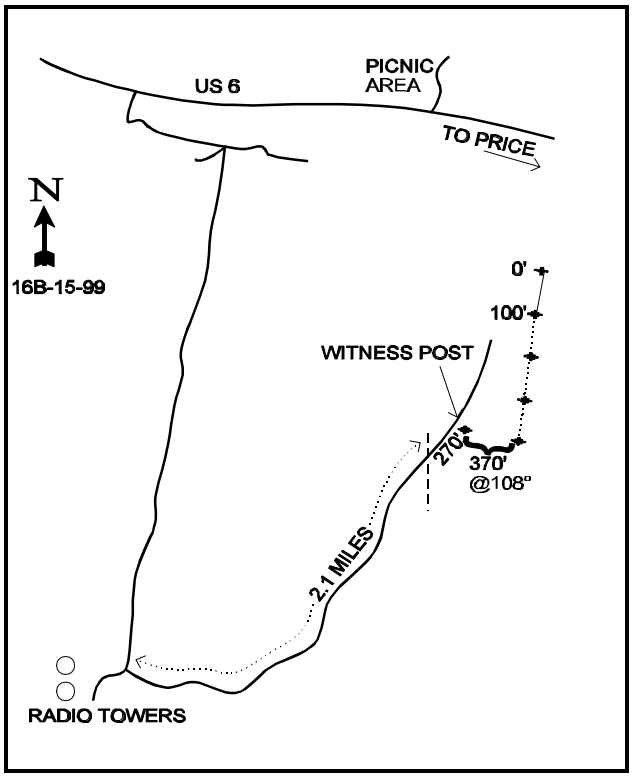
Compass bearing: frequency baseline 198°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take US 6 north from Price to the top of Price Canyon. About one mile NW of the picnic area, turn left towards Bristlecone BSA camp and the radio towers. Go 0.7 miles to a 3-way fork. Take the center road and go up the ridge 5.15 miles. Below the towers, turn left onto a rough road. Follow this road 2.1 miles to a fence. Continue 100 yards past the fence to a witness post on the right side of the road. From the witness post, walk approximately 125 yards (74 paces) east to the 400 foot stake. The first baseline stake, a 12" fencepost marked with browse tag #9014, is 400 feet to the north.





Map Name: Kyune

Diagrammatic Sketch

Township 12S , Range 9E , Section 18

UTM 4403236.223 N, 503161.821 E

DISCUSSION

Trend Study No. 16B-15 (30-1)

This study on Ford Ridge was established to monitor what was thought to be year-round elk range. Deer use is limited in most winters with an elevation of 8,700 feet. After 3 readings, this site will be discontinued in the future due to little or no use by big game. Pellet group transect data in 1999 indicate less than 1 deer day use/acre (2 ddu/ha) and just over 1 elk day use/acre (3 edu/ha). The open sage/grass ridge tops are windswept in winter, while the steep side hills bare off early, providing open country for winter elk use. Aspen stands in the draws and brushy east-facing slopes provide cover. The area is a checkerboard of private and BLM land used mainly for spring-to-fall cattle grazing. The study is located near the ridgeline with a northeast aspect and a slope of about 5%.

The soil is a moderately deep, clay texture with a slightly alkaline pH (7.4). Rock is fairly uniformly distributed throughout the profile as indicated by the estimated stoniness index. Erosion potential in the area is moderate to high as evidenced by washed-out roads and trails. Directly on the site, there is noticeable soil loss in the interspaces between shrubs. Percent bare ground increased in 1994, remaining nearly the same in 1999. Vegetation and litter cover both decreased in 1999, which could result in increased erosion in the future.

Mountain big sagebrush is the dominant browse providing 66% of the browse cover in 1999. During the 1988 reading, there were an estimated 11,066 sagebrush/acre, 89% of which were young plants. Seedling sagebrush numbered nearly 11,000 per acre indicating an expanding population. Since then the population has remained fairly stable with 10,500 plants/acre counted in 1994, and 11,440 in 1999. The population has become more mature with 86% and 79% of the population respectively consisting of mature plants in 1994 and 1999. Young plants make up only 13% and 7% of the population respectively in 1994 and 1999. The baseline was extended from 100 to 400 feet prior to reading in 1994. This larger sample better estimates browse densities which have clumped and/or discontinuous distributions, and would account for much of the changes in age class distribution of this big sagebrush population. Percent decadence increased from 2% in 1988 and 1994, to 14% in 1999. Fifty-nine percent of the decadent plants were classified as dying in 1999 which would point to a slightly declining population that may be thinning out. Vigor is mostly good and use light, with the majority of the mature plants showing good seed production in 1999. Twenty-two percent of the young plants encountered in 1988, displayed reduced vigor. Currently, all young plants display good vigor. Other shrubs present include snowberry, mountain low rabbitbrush, and a few serviceberry.

Herbaceous forage is an important element of this range. As with much of the Wasatch Plateau, the dominant grass species is Salina wildrye or bullgrass. Muttongrass is a preferred but less common species. Although large bunch grasses appear to dominate the site, there is still room for a variety of forbs. Seventeen species were encountered on the study area in 1994, and 21 in 1999. Forbs are an important component of deer and elk spring and summer diets, and preferred species like penstemon, milkvetches, and paintbrushes are important. Current use of herbaceous plants is light.

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1988. Relative percent cover of bareground has gone up slightly (22% to 26%) and litter has declined due to drought from 49% to 33%. However, vegetation and litter cover are abundant enough to stabilize the soil. Trend for soil is stable. The browse trend is stable currently, but the population has become increasingly mature (85%). Reproductive potential (proportion of young) has declined considerably due in large part to the dry conditions of the past several years. Vigor has improved and percent decadence is very low. Herbaceous trend is slightly down due to the drought. Four of the five perennial grasses on the site have declined significantly in their sum of nested frequency values. Several perennial forb species have also shown significant declines in their sum of nested frequency values.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil is down due to decreases in both vegetation and litter cover. Bare ground remains high at 30%, and noticeable soil loss is occurring in the interspaces between shrubs. Trend for the key browse, mountain big sagebrush, is slightly down. Percent decadency increased from 2% to 14%, and the proportion of decadent plants classified as dying is high at 59%. With low recruitment and biotic potential, this species appears to be declining in the future. Trend for the herbaceous component is slightly up. The sum of nested frequency for perennial species increased in 1999, following a large decrease in 1994 due to drought. Very few annuals are present at this elevation.

TREND ASSESSMENT
soil - down
browse - slightly down for the key species, mountain big sagebrush
herbaceous understory - slightly up

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	b25	a2	c48	12	1	19	.00	.46
G	Carex spp.	-	-	3	-	-	1	-	.03
G	Elymus salina	b299	b296	a262	91	93	91	14.07	5.50
G	Festuca ovina	1	3	6	1	1	3	.00	.06
G	Poa fendleriana	117	84	92	54	42	43	.93	.62
G	Poa pratensis	-	-	2	-	-	1	-	.00
G	Stipa spp.	15	6	8	5	3	4	.06	.07
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		457	391	421	163	140	162	15.08	6.75
Total for Grasses		457	391	421	163	140	162	15.08	6.75
F	Achillea millefolium	56	46	56	22	20	24	.25	.93
F	Antennaria rosea	a-	a-	b8	-	-	4	-	.21
F	Androsace septentrionalis (a)	-	1	1	-	1	1	.00	.00
F	Antennaria spp.	b24	b9	a-	10	4	-	.44	-
F	Arabis spp.	b9	a-	ab2	4	-	1	-	.00
F	Astragalus argophyllus	b22	a-	a-	11	-	-	-	-
F	Astragalus convallarius	12	19	14	5	8	8	.09	.09
F	Astragalus coltoni	b16	c37	a-	7	21	-	.25	-
F	Astragalus tenellus	a27	b56	c83	13	29	38	1.34	1.34

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Aster spp.	-	-	2	-	-	1	-	.03
F	Astragalus spp.	$_{a}$-	$_{a}$-	$_{b}$22	-	-	12	-	.21
F	Castilleja flava	$_{b}$34	$_{a}$19	$_{a}$18	18	9	13	.12	.24
F	Calochortus nuttallii	1	1	-	1	1	-	.00	-
F	Chaenactis douglasii	26	10	28	12	4	13	.07	.11
F	Comandra pallida	$_{a}$-	$_{ab}$5	$_{b}$7	-	2	4	.01	.05
F	Erigeron spp.	4	4	5	2	4	3	.02	.04
F	Eriogonum umbellatum	-	1	1	-	1	1	.00	.03
F	Holosteum umbellatum (a)	-	-	2	-	-	1	-	.00
F	Hymenoxys richardsonii	$_{b}$47	$_{c}$66	$_{a}$20	27	34	12	.50	.16
F	Lygodesmia spp.	$_{a}$-	$_{a}$-	$_{b}$12	-	-	6	-	.06
F	Machaeranthera canescens	7	7	4	3	3	2	.04	.03
F	Penstemon spp.	$_{a}$1	$_{b}$7	$_{a}$-	1	6	-	.08	-
F	Penstemon watsonii	$_{b}$92	$_{a}$41	$_{b}$81	47	20	39	.28	.91
F	Phlox longifolia	$_{b}$67	$_{a}$29	$_{a}$30	30	15	16	.07	.08
F	Senecio multilobatus	20	10	12	10	5	7	.05	.06
F	Taraxacum officinale	$_{a}$4	$_{a}$-	$_{b}$16	2	-	9	-	.04
Total for Annual Forbs		0	1	3	0	1	2	0.00	0.00
Total for Perennial Forbs		469	367	421	225	186	213	3.64	4.66
Total for Forbs		469	368	424	225	187	215	3.64	4.67

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 15

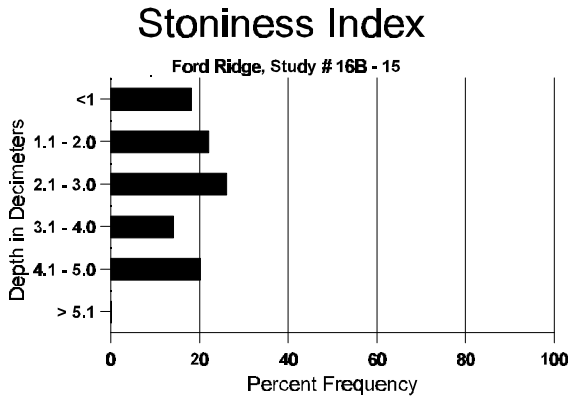
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	7	6	.18	-
B	Artemisia frigida	1	0	.03	-
B	Artemisia tridentata vaseyana	98	96	14.56	12.23
B	Chrysothamnus depressus	1	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	92	82	4.85	2.97
B	Mahonia repens	5	1	.45	.03
B	Opuntia spp.	1	1	.00	.00
B	Symphoricarpos oreophilus	57	50	3.65	3.26
B	Tetradymia canescens	0	2	.15	.00
Total for Browse		262	239	23.88	18.51

BASIC COVER --
Herd unit 16B, Study no: 15

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	335	329	9.25	39.45	31.47
Rock	248	190	8.50	9.01	5.87
Pavement	252	254	11.25	.82	4.77
Litter	396	374	48.75	39.74	30.96
Cryptogams	9	25	0	.16	.29
Bare Ground	333	314	22.25	30.53	30.12

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 15, Study Name: Ford Ridge

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.2	46.0 (16.2)	7.4	26.4	31.1	42.6	3.9	10.2	201.6	1.2



PELLET GROUP DATA --
Herd unit 16B, Study no: 15

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	14	2	n/a
Elk	4	-	1 (2)
Cattle	1	2	15 (37)
Deer	0	0	1 (2)
Sheep	0	0	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 15

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	88	4	-	3	-	-	-	-	-	-	5	-	2	-	466			7
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	8	2	-	1	-	-	-	-	-	11	-	-	-	220	17	26	11
	99	-	-	1	1	-	-	-	-	-	2	-	-	-	40	21	21	2
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	3	1	-	-	-	-	-	-	3	-	-	3	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	43%	29%	-48%
'94	17%	00%	00%	-25%
'99	33%	22%	44%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	466	Dec:	0%
	'94	240		0%
	'99	180		67%

Artemisia frigida																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	6	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	123	-	-	8	-	-	32	-	-	158	-	5	-	10866			163
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	8	-	-	2	-	-	-	-	-	10	-	-	-	200			10
Y	88	132	6	-	8	-	-	1	-	-	111	4	32	-	9800			147
	94	66	-	-	-	-	-	-	-	-	66	-	-	-	1320			66
	99	38	3	-	-	-	-	-	-	-	41	-	-	-	820			41
M	88	10	4	2	-	-	-	-	-	-	8	1	7	-	1066	14	19	16
	94	449	-	-	-	-	-	-	-	-	448	1	-	-	8980	10	19	449
	99	353	93	3	-	2	-	-	-	-	451	-	-	-	9020	12	24	451
D	88	2	-	1	-	-	-	-	-	-	1	-	2	-	200			3
	94	9	1	-	-	-	-	-	-	-	3	-	-	7	200			10
	99	69	8	-	1	2	-	-	-	-	33	-	-	47	1600			80
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	06%	02%	25%	- 5%
'94	.19%	00%	01%	+ 8%
'99	19%	.52%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	11066	Dec:		2%
'94	10500			2%
'99	11440			14%

Chrysothamnus depressus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	12	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	11	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	20		-
'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	88	8	-	-	-	-	-	2	-	-	10	-	-	-	666			10
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	48	4	-	-	-	-	-	-	-	51	-	1	-	3466			52
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
M	88	73	5	-	2	-	-	-	-	-	80	-	-	-	5333	7	9	80
	94	360	-	-	-	-	-	-	-	-	360	-	-	-	7200	7	11	360
	99	234	-	-	2	-	-	-	-	-	236	-	-	-	4720	8	11	236
D	88	18	-	-	-	-	-	-	-	-	18	-	-	-	1200			18
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	34	-	-	5	-	-	-	-	-	14	-	-	25	780			39
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	06%	00%	.66%	-25%
'94	00%	00%	00%	-24%
'99	00%	00%	09%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	9999	Dec:	12%
	'94	7520		2%
	'99	5700		14%

Mahonia repens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	92	-	-	-	-	-	-	-	-	92	-	-	-	1840	4	5	92
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	5	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	-97%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	1920		-
	'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	8	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	4	1
D	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-85%
'94	00%	00%	00%	-67%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	33%
	'94	60		0%
	'99	20		0%

Symphoricarpos oreophilus																		
S	88	8	-	-	-	-	-	5	-	-	13	-	-	-	866			13
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	33	2	1	-	-	-	3	-	-	33	-	6	-	2600			39
	94	9	-	-	1	-	-	-	-	-	10	-	-	-	200			10
	99	14	-	-	4	-	-	-	-	-	15	-	3	-	360			18
M	88	14	4	4	-	-	-	-	-	-	11	-	11	-	1466	12	18	22
	94	98	11	-	4	-	-	-	-	-	113	-	-	-	2260	11	25	113
	99	57	3	-	3	-	-	-	-	-	61	-	2	-	1260	12	26	63
D	88	5	-	-	-	-	-	-	-	-	1	-	4	-	333			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	1	-	-	-	-	-	1	-	2	5	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	09%	08%	32%	-44%
'94	09%	00%	00%	-28%
'99	03%	00%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	4399	Dec:	8%
	'94	2460		0%
	'99	1780		9%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	15	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	9	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	0%
	'94	0		0%
	'99	80		25%

Trend Study 16B-16-99

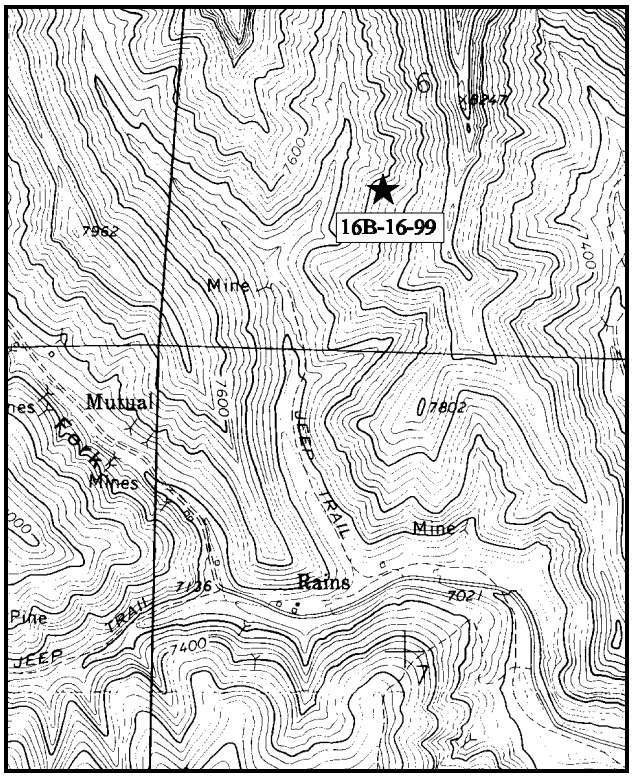
Study site name: Hardscrabble . Range type: Big Sagebrush - Grass .

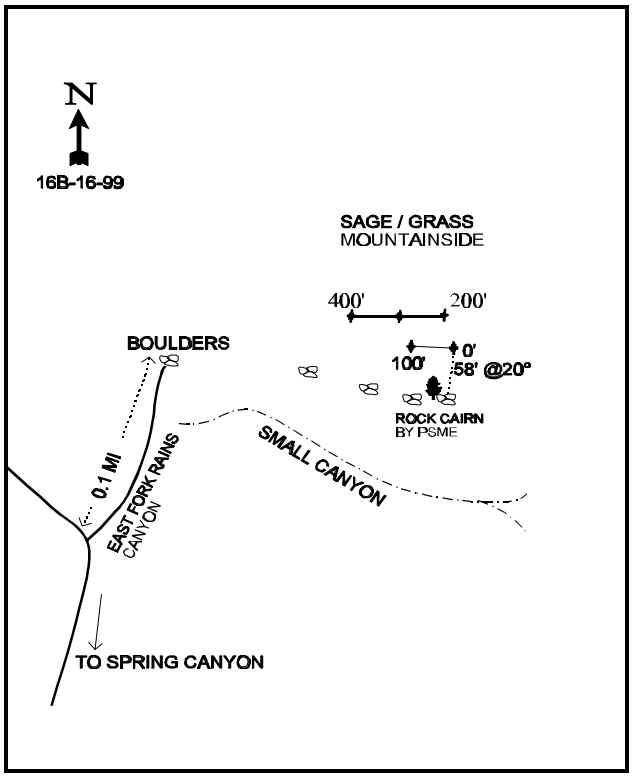
Compass bearing: frequency baseline 270°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34 & 71 ft), line 3 (59ft).

LOCATION DESCRIPTION

From US 6 in Helper, turn west onto North Main St. at the Texaco station. Go straight until you come to Uintah St., then turn left. Continue on to Canyon St., then turn right. Go 1.35 miles to an old R.R. trestle. Continue 2.6 miles to a fork. Stay left on the oiled road and proceed 2.5 miles. Before the concrete bridge in the ghost town of Rains, turn right onto a dirt road by a UP&L substation. Go up Rains Canyon 1 mile to the East Fork. Go up the East Fork of Rains Canyon 0.1 miles to the end of the road. The study is located about halfway up the ridge to the east. Hike up the steep ridge to a rock cairn by a lone Douglas Fir tree. The frequency baseline 0' stake is 58 feet north of the cairn. The 2' tall fencepost has browse tag #7111 attached.





Map Name: Standardville Diagrammatic Sketch

Township 13S , Range 9E , Section 6 UTM 4396522.094 N, 503526.206 E

DISCUSSION

Trend Study No. 16B-16 (30-2)

The grassy ridges and steep side hills in the Hardscrabble area are important winter and spring range for elk. There are scattered blocks of private land in this area administered by the BLM. It is cattle spring-fall range, but livestock use is insignificant on the steep upper slopes. The range type is sagebrush/grass, with Salina wildrye (*Elymus salina*) being the dominant species. The sidehills in this area are all very steep. The study site has a slope of approximately 50%. The north-facing slopes in the area support mountain brush and conifers, while the south slopes are dominated by grasses. Aspect on the study area is to the west with an elevation of 7,600 feet. Pellet group transect data from 1999 indicate a moderate level of use by elk with an estimated 41 elk days use/acre (101 edu/ha). Deer use was light with an estimated 2 deer days use/acre (5 ddu/ha).

Although very rocky, the soil appears to be moderately deep with an estimated effective rooting depth of over 19 inches. The soil textural class is clay loam, with a slightly alkaline pH (7.5). Due to the uniform coverage by bunch grasses, and the prevalence of boulders, cobble and gravel as erosion pavement on the soil surface, the soil is fairly well protected against erosion. On such a steep slope, there will always be some soil movement but it does not appear excessive on this area. Some pedestaling has occurred on the uphill side of the bunch grasses. Phosphorus is low at 3.9 ppm, where 10 ppm has been shown to be necessary for normal plant growth and development. Bare ground makes up only 11% ground cover in 1999, a decrease from 15% in 1994. Litter cover declined from 40% to 21% in 1994 due to drought conditions, but has since increased to nearly 26% in 1999. The increase in litter and decrease in bare ground points to improving soil conditions.

Browse is rather limited on the slope, but is not key as this site does not sample a critical winter browse range. Black sagebrush is the most common species with an estimated density of 5,932 plants/acre in 1988, 5,360 in 1994, and 8,540 plants/acre in 1999. The baseline was lengthened and realigned in 1999 which accounts for most of the large increase in density for black sagebrush over previous readings. Black sagebrush naturally has a somewhat hedged appearance, but half of these shrubs were classified as heavily hedged in 1988. Use in 1994 and 1999 was light to moderate. Percent decadency was high in 1988 and 1994 at 58% and 46% respectively, but has declined to 28% in 1999. Currently, 31% of the decadent plants are classified as dying. However, recruitment is high at 20% and the young age class is sufficient to replace those individuals that are classified as dying. Other species on or near the site include mountain big sagebrush, Greene's rabbitbrush, a shrubby eriogonum, snowberry, and curlleaf mountain mahogany. This is a marginal site for mountain big sagebrush, and none were sampled in 1999 with the realignment of the baseline. Snowberry has also declined and was not found in 1994 or 1999. The curlleaf mahogany in the vicinity is highlined.

Perennial grasses dominate the site with an estimated cover of over 16% in 1994, and nearly 19% in 1999. Salina wildrye, the most abundant grass, is large and vigorous but produces only poor to fair forage. Bluebunch wheatgrass and muttongrass are also very common. Salina wildrye and bluebunch wheatgrass together provide 59% of the total vegetative cover at the site. Forbs are uncommon and relatively unimportant as a forage source on this site. A large *Astragalus* is the most common forb, being sampled in 32% of the quadrats.

1994 TREND ASSESSMENT

Ground cover characteristics have changed due to the drought conditions which have existed over the past few years. Litter cover has declined by nearly 50%, while bare ground has increased by over 50%. However, due to the abundance of herbaceous vegetation, erosion does not appear to be a serious problem. Trend for soil is down slightly due to the reduction of protective ground cover. Trend for browse is stable. Black sagebrush, the key browse species on the site, has a stable population with reduced heavy use, decrease in decadency, and good vigor. Drought conditions have caused a decline in mountain big sagebrush and snowberry, but this

is a marginal site for these shrubs. The site is dominated by grasses. Both bluebunch wheatgrass and Salina wildrye increased significantly in sum of nested frequency while mutton grass declined significantly. Overall, sum of nested frequency for grasses declined slightly. Forbs were never very abundant on the site. Combined, they currently make up less then 1% cover on the site and sum of nested frequency has declined 30%. Trend for herbaceous understory is down slightly.

TREND ASSESSMENT
soil - slightly down
browse - stable
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil is slightly up. Erosion is minimal even with the excessive slope. The increase in percent litter cover coupled with the decrease in bare soil cover suggests an improving soil condition. Sum of nested frequency for perennial grasses and forbs increased as well, which indicates better distribution of protective ground cover to hold soils in place. Trend for the key browse, black sagebrush, is up slightly. Percent decadency decreased and recruitment is high. Use is light to moderate with good seed production. The herbaceous understory shows upward trends as the perennial species increased in sum of nested frequency and cover since the 1994 reading.

TREND ASSESSMENT
soil - slightly up
browse - slightly up for black sagebrush, although not critical for this site
herbaceous understory - up

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	151	175	178	63	66	74	5.31	7.04
G	Elymus salina	a198	ab243	b265	76	87	92	10.69	10.61
G	Poa fendleriana	c191	a70	b118	83	32	51	.43	1.21
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		540	488	561	222	185	217	16.45	18.86
Total for Grasses		540	488	561	222	185	217	16.45	18.86
F	Andropogon scoparius	-	1	-	-	1	-	.00	-
F	Arabis spp.	1	2	8	1	1	4	.00	.02
F	Astragalus tenellus	a-	b6	a-	-	5	-	.06	-
F	Astragalus spp.	c128	a2	b71	56	2	32	.03	2.99
F	Castilleja linariaefolia	-	2	-	-	1	-	.00	-
F	Erigeron eatonii	1	-	-	1	-	-	-	-
F	Eriogonum elatum	-	2	-	-	1	-	.00	-
F	Lesquerella spp.	-	-	2	-	-	1	-	.00
F	Machaeranthera grindelioides	8	13	15	4	6	8	.11	.13

Type	Species	Nested Frequency '88	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '88	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
F	Phlox longifolia	-	5	-	-	2	-	.01	-
F	Schoencrambe linifolia	a-	b6	ab5	-	4	2	.04	.01
F	Senecio multilobatus	-	4	2	-	2	2	.01	.01
Total for Annual Forbs		0	0	0	0	0	0	0	0
Total for Perennial Forbs		138	43	103	62	25	49	0.28	3.17
Total for Forbs		138	43	103	62	25	49	0.28	3.17

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 16

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia frigida	16	22	.01	.07
B	Artemisia nova	87	92	6.14	7.14
B	Artemisia tridentata vaseyana	15	0	.18	-
B	Chrysothamnus depressus	0	2	.00	.03
B	Chrysothamnus viscidiflorus viscidiflorus	7	2	-	-
B	Eriogonum corymbosum	4	4	.00	.15
B	Gutierrezia sarothrae	15	20	.36	.20
B	Juniperus osteosperma	-	-	.63	.15
B	Pinus edulis	0	1	-	.15
B	Symphoricarpos oreophilus	0	0	-	-
Total for Browse		144	143	7.33	7.89

CANOPY COVER --
Herd unit 16B, Study no: 16

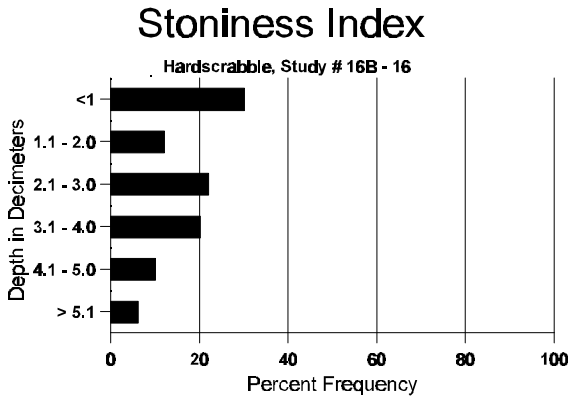
Species	Percent Cover '99
Pinus edulis	1

BASIC COVER --
Herd unit 16B, Study no: 16

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	314	326	14.75	28.01	34.47
Rock	357	313	16.75	26.09	24.68
Pavement	313	309	18.00	3.29	9.48
Litter	372	360	40.25	21.05	25.95
Cryptogams	104	203	2.50	1.75	3.34
Bare Ground	299	271	7.75	15.39	11.73

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 16, Study Name: Hardscrabble

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
19.3	47.4 (17.7)	7.5	36.0	35.4	28.6	2.7	3.9	112.0	0.7



PELLET GROUP DATA --
Herd unit 16B, Study no: 16

Type	Quadrat Frequency ⁞94	⁞99	Pellet Transect Days Use/Acre (ha) ⁞99
Rabbit	14	1	n/a
Elk	49	55	41 (101)
Deer	7	4	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 16

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia frigida																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
M	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133	9	3	2
	94	20	-	-	-	-	-	-	-	-	20	-	-	-	400	7	8	20
	99	28	-	-	-	-	-	-	-	-	28	-	-	-	560	7	7	28

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+53%
'94	00%	00%	00%	+54%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	199	Dec:	-
	'94	420		-
	'99	920		-

Artemisia nova																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	99	23	-	-	3	-	-	-	-	-	26	-	-	-	520			26
Y	88	4	4	1	-	-	-	-	-	-	9	-	-	-	600			9
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	99	86	-	-	1	-	-	-	-	-	83	4	-	-	1740			87
M	88	7	5	16	-	-	-	-	-	-	28	-	-	-	1866	8	14	28
	94	109	22	-	-	-	-	-	-	-	120	9	2	-	2620	19	21	131
	99	141	61	17	1	-	-	-	-	-	220	-	-	-	4400	6	14	220
D	88	8	16	28	-	-	-	-	-	-	49	-	1	2	3466			52
	94	81	35	-	4	-	-	-	-	-	93	9	9	9	2400			120
	99	59	51	9	1	-	-	-	-	-	83	-	-	37	2400			120
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	900			45
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	1840			92

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	28%	51%	03%	-12%
'94	22%	00%	08%	+39%
'99	26%	06%	09%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	5932	Dec:	58%
	'94	5220		46%
	'99	8540		28%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	6	2	-	-	-	-	-	-	-	8	-	-	-	533			8
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	4	2	3	-	-	-	-	-	-	9	-	-	-	600	8	12	9
	94	15	-	-	-	-	-	-	-	-	15	-	-	-	300	7	10	15
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	4	1	1	-	-	-	-	-	-	5	-	-	1	400			6
	94	3	-	-	2	-	-	-	-	-	5	-	-	-	100			5
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	22%	17%	04%	-74%
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1533	Dec:	26%
	'94	400		25%
	'99	0		0%

Chrysothamnus depressus

M	88	1	1	-	-	-	-	-	-	-	2	-	-	-	133	4	13	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	8	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	50%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	133	Dec:	-
	'94	0		-
	'99	60		-

Chrysothamnus viscidiflorus viscidiflorus

M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200	6	10	10
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	11	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	-80%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	200		-
	'99	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum corymbosum																		
M	88	-	2	-	-	-	-	-	-	-	2	-	-	-	133	8	16	2
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	11	25	5
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	11	19	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	-25%
'94	00%	00%	00%	-20%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	133	Dec:		-
'94	100			-
'99	80			-

Gutierrezia sarothrae																		
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	7	-	-	-	-	-	-	-	-	7	-	-	-	466	10	5	7
	94	28	-	-	-	-	-	-	-	-	28	-	-	-	560	8	9	28
	99	34	-	-	-	-	-	-	-	-	34	-	-	-	680	7	8	34

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+ 0%
'94	00%	00%	00%	+17%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	599	Dec:		-
'94	600			-
'99	720			-

Pinus edulis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	20			-

Symphoricarpos oreophilus																		
M	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66	9	8	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	19	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:		-
'94	0			-
'99	0			-

Trend Study 16B-17-99

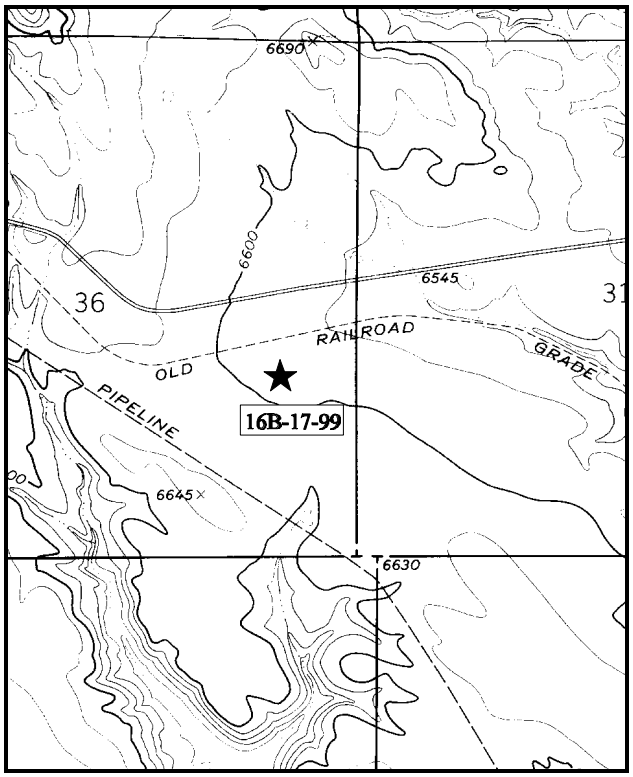
Study site name: Slackpile . Range type: Big Sagebrush - Grass .

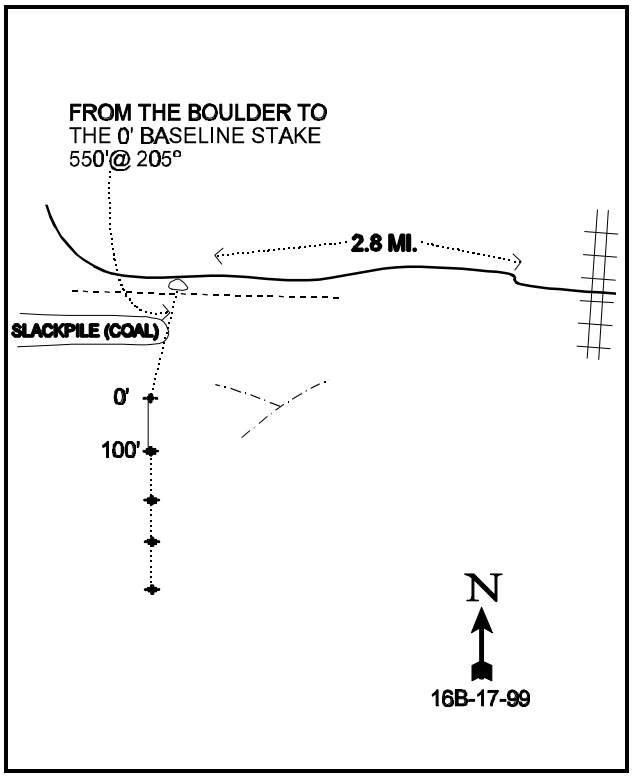
Compass bearing: frequency baseline 165°M- Line 1 & 2; 163°M- Line 3 & 4.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

On US 6 north of Helper, turn west onto Consumers Road. Proceed west 3.2 miles to the railroad tracks. Cross the tracks and continue 2.8 miles to a large boulder on the left. The study is located in the sagebrush south of the fence. Walk 550 feet at 190°M from the boulder to the start of the frequency baseline. The first stake is marked with a red browse tag, #9022.





Map Name: Standardville

Diagrammatic Sketch

Township 13S , Range 8E , Section 36

UTM 4388792.606 N, 502890.346 E

DISCUSSION

Trend Study No. 16B-17 (30-3)

The Slackpile study samples a representative sagebrush/grass site owned by the Division. The sagebrush/grass type covers an extensive part of the Gordon Creek range, an important wintering area for large numbers of deer. At the time of study establishment, the Division permitted spring cattle grazing, May 15 to June 15, with 150 AUMs on the south side of Consumers Road. Grazing has since been discontinued although trespass cattle were on the site when it was read in May of 1999. Currently, livestock use is moderately low with 23 cow days use/acre (57 cdu/ha) being estimated from the pellet group transects. Use by deer is moderately high with an estimated 65 deer days use/acre (160 ddu/ha) being estimated in 1999.

The study is at 6,600 feet in elevation on an 8% north-facing slope. Soil texture is a loam with a slightly alkaline pH (7.5). The surface is very hard with a crust present. The formation of cracks is occurring with the drying of the soil surface. The soil is moderately deep with an estimated effective rooting depth of 18 inches. There are very few rocks or pavement on the surface or throughout the profile. The stoniness index is more a measure of the compaction of the profile than actual presence of rock. There is a considerable amount of bare ground on the site, currently estimated at 43%. Pedestaling is present around the baseline stakes and shrub stems. Exposed roots and small gullies indicate some erosion problems on the site. Phosphorus (5.1 ppm) and potassium (44.8 ppm) are lower than the 10 ppm and 70 ppm that have been shown necessary for normal plant development and growth.

The various ecotypes and hybrids of big sagebrush in the area make plant classification difficult. On the study site, all big sagebrush were classified as Wyoming big sagebrush. Some black sagebrush was also encountered in 1994. Density for Wyoming big sagebrush has remained stable over all sampling years, and is estimated at 2,800 plants/acre in both 1994 and 1999. Cover for this species increased in 1999 to just over 7%. Browsing was heavy in 1988 when 44% of the Wyoming big sage displayed heavy use. Use was more moderate in 1994 with only 7% of the sagebrush displaying heavy use. Currently, utilization on sagebrush is high with 31% showing moderate use, and 42% displaying heavy use. Percent decadence has bounced around with each reading from 42% in 1988, to 57% in 1994, then decreasing to 36% in 1999. Ten percent of the population currently displays poor vigor. Biotic potential (number of seedlings) and recruitment have greatly decreased since the initial reading, currently at 0% and 9% respectively. Stickyleaf low rabbitbrush is the most abundant shrub in both cover and density and is currently estimated at 19,040 plant/acre, an increase of 34% since the 1994 reading. This is mostly a mature population with 23% of the plants showing moderate use. Broom snakeweed is also present, but after a large decrease due to drought during the previous reading, appears to be stabilizing at the present time.

Species richness of herbaceous vegetation is average for this range type with 7 grass and 7 forb species identified in 1994. The number of herbaceous species sampled in 1999 increased, with 7 grasses and 17 forbs present. However, most of the increase in forbs comes from species infrequently encountered. Bluebunch wheatgrass is the most abundant grass on the site with a quadrat frequency of 70% in 1994, increasing to 87% in 1999. It currently provides 76% of the grass cover, and 64% of the herbaceous cover, and was lightly utilized in 1999. Indian ricegrass and blue grama are the next most abundant grasses, but are decreasing in frequency. Nested frequency for all perennial grasses combined decreased in 1999. Forbs are unimportant as a forage source on this site, and provide very little protective cover.

1994 TREND ASSESSMENT

Protective ground cover has increased since 1988, with bare ground now covering 40% of the ground surface. Percent litter and cryptogamic cover have declined somewhat but vegetative cover appears to have increased. In 1988, basal vegetation cover was estimated at 4.5%. Aerial vegetation cover was estimated at 29% during the 1994 reading. Fifty-one percent of that cover comes from herbaceous vegetation which is best at holding

soil in place. There is still a considerable amount of exposed soil and some signs of soil movement, but it does not appear to be severe. Trend for soil is therefore improving.

Browse trend is down. The key species on this site is Wyoming big sagebrush. It's population density is currently stable with light to moderate use and good vigor. However, biotic and reproductive potentials are low and percent decadency has increased from 42% to 57%. The number of dead plants was estimated at 1,580 plants/acre in 1994, a very high number. The main negative aspect of this site is the extremely high number of small rabbitbrush (12,620 plants/acre). Currently, the population is mostly mature with few young and decadent. This shrub will replace Wyoming big sagebrush if current trends continue. The only positive aspect of the browse trend on this site is the 90% reduction in broom snakeweed density (13,398 to 1,400 plants/acre). Broom snakeweed is a short-lived shrub which commonly dies off in large numbers during extended drought.

Sum of nested frequency for grasses have remained fairly stable since the last reading, while those of the forbs have declined 45%. The native, bluebunch wheatgrass, increased significantly, nearly doubling in nested frequency. All other grasses encountered in 1988, declined significantly in nested frequency. Even though the sum of nested frequency for grasses and forbs combined declined, it appears in the photos that the grasses are much larger than they were previously. However, without cover data for individual species in 1988, we cannot make any direct comparisons. Trend for grasses is stable while those for forbs is down.

TREND ASSESSMENT
soil - improving
browse - down due to abundance of the increaser rabbitbrush and an increase in decadence for sagebrush
herbaceous understory - stable overall, stable for grasses but down for forbs

1999 TREND ASSESSMENT

Trend for soil is stable, but still in poor condition. Relative bare ground cover is the same as in 1994. The ratio of protective cover to bare soil has actually improved slightly Bare ground cover still remains relatively high and soil movement is noticeable with pedestaling occurring around the base of shrubs. The proportion of protective ground cover (herbaceous vegetation, cryptogams, and litter) to bare ground is marginally low, indicating high amounts of exposed bare soil. Wyoming big sagebrush, the key species, has a stable trend. The population density remains stable overall, although biotic potential and recruitment are low. Percent decadency decreased from 57% to 36%, however, the proportion of the population displaying heavy use increased from 7% to 42% in 1999. A negative aspect for browse on the site comes from the increase in stickyleaf low rabbitbrush, currently at 19,040 plants/acre. As a result, trend for browse is slightly down overall. Any continued increase in rabbitbrush could result in deleterious effects to the key species, Wyoming big sagebrush. Trend for the herbaceous understory is stable overall. Perennial grass sum of nested frequency decreased, while perennial forb nested frequency increased.

TREND ASSESSMENT
soil - stable
browse - stable for the key species, Wyoming big sage, but slightly down overall due to the increase in rabbitbrush
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	a127	b211	b235	53	70	87	10.30	8.85
G	Bouteloua gracilis	a-	c37	b30	-	11	10	1.72	1.22
G	Elymus salina	a-	b17	b20	-	6	7	.51	.87
G	Oryzopsis hymenoides	95	81	53	41	35	25	1.77	.57
G	Poa fendleriana	-	3	3	-	2	1	.01	.03
G	Sitanion hystrix	b172	a26	a7	69	10	3	.29	.04
G	Stipa columbiana	-	4	-	-	2	-	.03	-
G	Stipa comata	b15	a2	ab3	6	1	2	.03	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		409	381	351	169	137	135	14.68	11.61
Total for Grasses		409	381	351	169	137	135	14.68	11.61
F	Arabis spp.	b6	a-	ab5	3	-	2	-	.01
F	Astragalus convallarius	b44	a5	b35	21	2	17	.01	.08
F	Castilleja linariaefolia	ab1	a-	b13	1	-	7	-	.20
F	Carduus nutans (a)	-	-	3	-	-	2	-	.01
F	Calochortus nuttallii	a1	a-	b16	1	-	8	-	.04
F	Collinsia parviflora (a)	-	a-	b5	-	-	3	-	.01
F	Eriogonum umbellatum	-	3	10	-	1	4	.15	.16
F	Machaeranthera grindelioides	9	10	19	6	4	10	.07	.07
F	Mammillaria spp.	1	-	-	1	-	-	-	-
F	Orthocarpus purpureo-albus (a)	b46	a-	a-	23	-	-	-	-
F	Penstemon caespitosus	c43	b23	a-	23	12	-	.11	-
F	Penstemon spp.	a-	a-	b31	-	-	16	-	.13
F	Phlox austromontana	a3	b29	b32	3	14	15	.36	.70
F	Phlox longifolia	b235	a106	a88	88	40	40	.25	.25
F	Physaria spp.	-	-	1	-	-	1	-	.00
F	Potentilla spp.	-	-	2	-	-	1	-	.03
F	Schoencrambe linifolia	a-	a-	b9	-	-	6	-	.03
F	Sphaeralcea coccinea	44	45	49	22	17	21	.35	.20
F	Thlaspi montanum	-	-	2	-	-	1	-	.00
F	Trifolium gymnocarpon	b59	a-	b47	28	-	23	-	.24
Total for Annual Forbs		46	0	8	23	0	5	0	0.02
Total for Perennial Forbs		446	221	359	197	90	172	1.31	2.18
Total for Forbs		492	221	367	220	90	177	1.31	2.21

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 17

Type	Species	Strip Frequency ⁽94	⁽99	Average Cover % ⁽94	⁽99
B	Artemisia nova	4	3	.76	.38
B	Artemisia tridentata wyomingensis	74	73	5.03	7.57
B	Atriplex canescens	0	0	-	-
B	Ceratoides lanata	0	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	90	95	6.42	8.37
B	Echinocereus spp.	0	3	-	.00
B	Gutierrezia sarothrae	42	27	.17	.30
B	Opuntia spp.	17	19	.22	.37
B	Pinus edulis	0	0	.00	-
B	Sclerocactus	0	1	-	-
Total for Browse		227	221	12.63	17.00

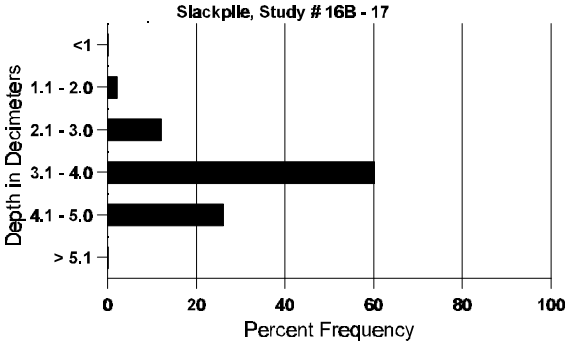
BASIC COVER --
Herd unit 16B, Study no: 17

Cover Type	Nested Frequency ⁽94	⁽99	Average Cover % '88	'94	'99
Vegetation	327	324	4.50	28.70	30.32
Rock	16	1	0	.06	.00
Pavement	19	4	.50	.09	.01
Litter	377	356	29.25	25.67	21.25
Cryptogams	138	216	10.00	2.78	9.93
Bare Ground	354	351	55.75	40.50	42.94

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 17, Study Name: Slackpile

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
18.0	56.0 (18.1)	7.5	39.3	34.2	26.6	1.5	5.1	44.8	0.6

Stoniness Index



PELLET GROUP DATA --
Herd unit 16B, Study no: 17

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	8	54	n/a
Elk	4	2	0
Deer	48	59	65 (161)
Cattle	1	6	23 (57)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 17

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	3	-	-	-	-	-	-	-	4	-	-	-	80	16	34	4
	99	-	3	-	-	-	5	1	-	-	9	-	-	-	180	7	14	9
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	1	-	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	-	-	-	-	2	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	00%	13%	+27%
'99	27%	64%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		0%
	'94	160		25%
	'99	220		18%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	4	6	2	-	-	-	-	-	-	12	-	-	-	800			12
	94	2	1	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	8	2	-	-	1	1	-	-	-	12	-	-	-	240			12
M	88	1	6	7	-	-	-	-	-	-	14	-	-	-	933	13	18	14
	94	34	21	1	1	-	-	-	-	-	55	-	-	2	1140	16	23	57
	99	4	6	17	2	20	23	5	-	-	77	-	-	-	1540	18	27	77
D	88	-	6	11	-	-	-	2	-	-	17	-	2	-	1266			19
	94	19	51	8	-	-	1	1	-	-	64	-	-	16	1600			80
	99	10	4	7	-	10	11	9	-	-	35	2	-	14	1020			51
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1580			79
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1940			97

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	40%	44%	04%	- 7%
'94	52%	07%	13%	+ 0%
'99	31%	42%	10%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	2999	Dec:	42%
	'94	2800		57%
	'99	2800		36%

Atriplex canescens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	47	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Ceratoides lanata																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	88	30	-	-	-	-	-	-	-	-	30	-	-	-	2000			30
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	27	-	-	-	-	-	1	-	-	28	-	-	-	560			28
Y	88	657	7	-	-	-	-	-	-	-	664	-	-	-	44266			664
	94	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
	99	156	9	-	-	2	6	-	-	-	173	-	-	-	3460			173
M	88	118	20	1	2	-	-	-	-	-	141	-	-	-	9400	6	9	141
	94	598	-	-	12	-	-	-	-	-	610	-	-	-	12200	5	12	610
	99	502	206	29	-	-	26	12	-	-	775	-	-	-	15500	4	9	775
D	88	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	4	-	-	-	-	-	-	-	-	1	-	-	3	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	03%	.12%	00%	-77%
'94	00%	00%	.15%	+34%
'99	23%	06%	.31%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	53799	Dec:	0%
	'94	12620		0%
	'99	19040		0%

Echinocereus spp.																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	2	4	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	37	-	-	-	-	-	-	-	-	37	-	-	-	2466			37
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	157	-	-	-	-	-	-	-	-	157	-	-	-	10466	7	7	157
	94	70	-	-	-	-	-	-	-	-	70	-	-	-	1400	8	5	70
	99	99	-	-	-	-	-	-	-	-	99	-	-	-	1980	4	3	99
D	88	7	-	-	-	-	-	-	-	-	5	-	1	1	466			7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	.99%	-90%
'94	00%	00%	00%	+30%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	13398	Dec:	3%
	'94	1400		0%
	'99	2000		0%

Opuntia spp.																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	4	-	-	-	-	-	-	-	-	3	-	1	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	88	2	-	-	-	-	-	-	-	-	1	-	1	-	133	3	7	2
	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440	4	13	22
	99	16	-	-	-	-	-	-	-	-	16	-	-	-	320	3	13	16
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	1	1	-	-	-	-	-	1	-	-	5	120			6
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	33%	+ 9%
'94	00%	00%	00%	+19%
'99	00%	04%	19%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	0%
	'94	440		0%
	'99	540		22%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	0			-

Sclerocactus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	0		-
'99	20		-

Trend Study 16B-18-99

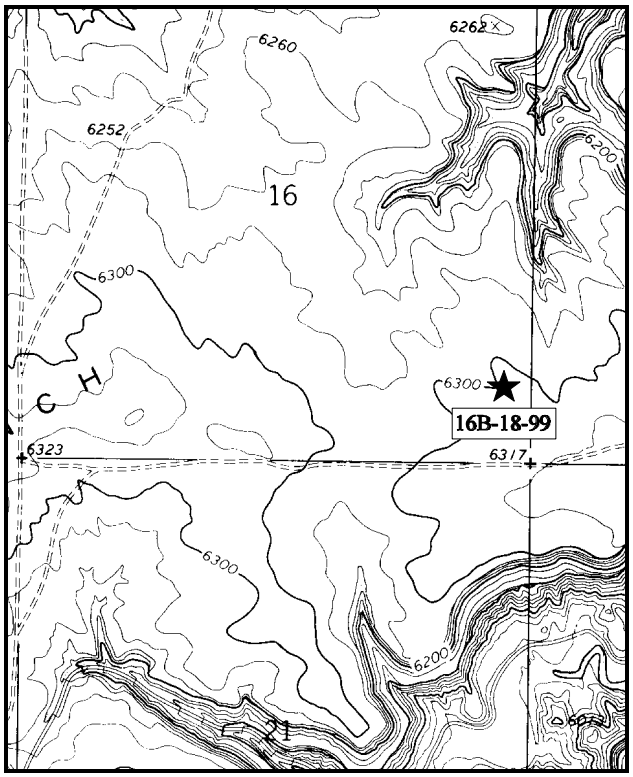
Study site name: Porphyry Bench . Range type: Big Sagebrush - Grass .

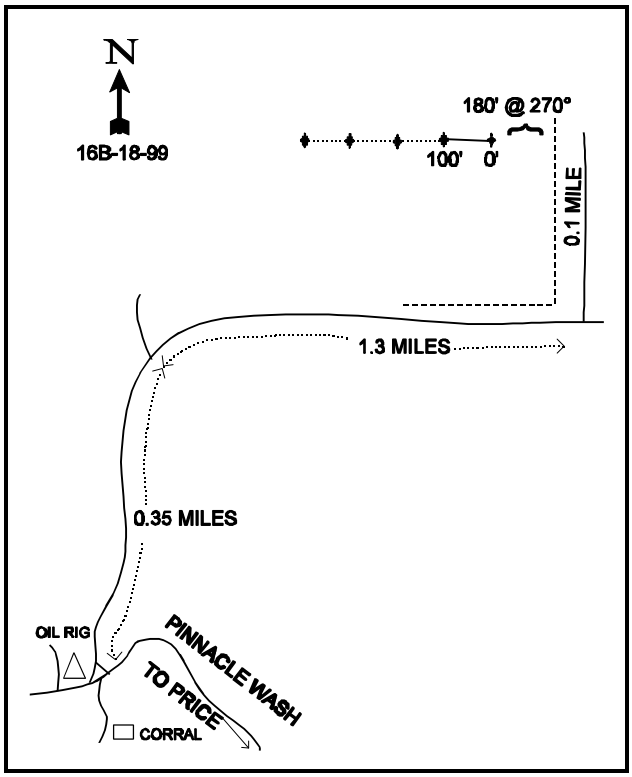
Compass bearing: frequency baseline 270°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take Westwood Blvd (1550 W) northwest out of Price 2.35 miles to a major intersection. Turn left onto Gordon Creek Road and travel 0.45 miles to a fork. Bear left away from Gordon Creek, going 0.1 miles to a gravel pit. Continue 5.2 miles on the Pinnacle Peak Road to a 3-way fork at the top of the bench. Go right 0.35 miles to a fork. Bear right and continue 1.3 miles, going alongside a fence to the SE corner. Turn left and go along the fence 0.1 mile to the fifth wood post from the corner. Walk west into the sagebrush 180 feet to the 0-foot baseline stake. It is a 1 1/2 foot tall fencepost marked by browse tag #9021.





Map Name: Pinnacle Peak

Diagrammatic Sketch

Township 14S , Range 9E , Section 16

UTM 4383381.268 N, 507730.346 E

DISCUSSION

Trend Study No. 16B-18 (30-4)

The Porphyry Bench study site is located on Porphyry Bench which is critical deer winter range. The bench is largely a sagebrush/grass type, with juniper covered side hills and draws. The study is on a very gentle (1-2%) west-facing slope at an elevation of 6,300 feet. Located on a fenced 1/4 section of DWR land, the study site shows signs of heavy deer use. A nearby pellet group transect has had an average of 45 deer days use/acre between 1988 and 1994. Pellet group transect data from 1999 on the study site indicate extremely high deer use with an estimated 149 deer days use/acre (369 ddu/ha). Use by elk and livestock is light with an estimated 1 elk days use/acre (3 edu/ha) and 4 cow days use/acre (9 cdu/ha).

The soil appears to be moderately deep with an estimated effective rooting depth of just over 16 inches. A compacted layer is present at about 16 inches below the surface. Rock and pavement cover is nearly non-existent on the surface, and very little is found in the profile. The soil has a loam texture with a moderately alkaline pH (8.1). Potassium is very low at 25.6 ppm, when 70 ppm is the minimal level shown to be necessary for normal plant development and growth. Surface erosion is minimal on the site due to the level topography and substantial vegetation and litter cover. Evidence of some pedestaling is apparent around the base of sagebrush stems and the larger bunch grasses.

Wyoming big sagebrush is the key species for this site. When this site was initially established in 1988, the Wyoming big sage population was characterized as being large and vigorous with good leader growth, with marginal seed production. The mature shrubs sampled in 1988 were heavily utilized with 48% of the shrubs displaying heavily hedging. Density was 6,933 plants/acre, 19% of which were young shrubs. Vigor was generally good, but 46% percent of the population was classified as decadent. By 1994, there was an estimated 6,200 mostly mature sagebrush (71%). No seedlings were encountered and young plants numbered only 220 plants/acre. Utilization was light and vigor had improved. Percent decadency also declined to 25%. Currently, the population is estimated at 7,540 plants/acre, with 62% of these being mature plants. Biotic potential is very low (1%), with moderate recruitment from the young age class (10%). Percent decadency slightly increased from 25% to 28%, with plants displaying poor vigor remaining nearly the same. Deer use of the area has greatly increased since the 1994 reading as evidenced by pellet group counts and the level of use on the mature shrubs. Heavy use was displayed on 56% of the population in 1999, where no plants were classified as such in 1994. Seed production is currently very low. Continued heavy use coupled with drought could result in the decline of the sagebrush population in the future.

Clumps of pricklypear cactus are exceptionally abundant. The cactus has been nearly as abundant as sagebrush over all sampling years in terms of strip frequency, and currently provides 4% cover, or 24% of the browse cover. Age class analysis indicates a mostly mature population with increasing decadency since the last reading (1% to 10%). The fragile pricklypear spreads readily, as the joints easily break off and then root. A few curlleaf mountain mahogany and winterfat occur in the vicinity, but these valuable species are relatively uncommon.

The most abundant grass is needle-and-thread with a quadrat frequency on average of 88% over all sampling periods. Cover provided by this species was high in 1994 at nearly 9%, increasing to nearly 10% in 1999. Needle-and-thread currently provides 69% of the grass cover, and 31% of the total vegetation cover on the site. Generally vigorous, some individuals had a black fungus on the seed heads in 1988. Other grasses present at the site include: Indian ricegrass, bottlebrush squirreltail and Salina wildrye. Several species of annual forbs and also cheatgrass are present, but are not very common. Perennial forbs include scarlet globemallow, longleaf phlox, and lobeleaf groundsel.

1994 TREND ASSESSMENT

Ground cover characteristics have improved on this site. Aerial cover of vegetation currently covers nearly 28% of the ground surface. Fifty-three percent of that cover comes from grasses and forbs. Litter cover has declined, but this trend is common during these dry years. Bare ground has also declined from 43% to 35%, and erosion is not currently a problem. The browse trend is currently stable. Percent decadency has declined from 46% to 25%. No seedlings were encountered in 1994, and young plants only make up almost 4% of the population. Reproductive potential will likely improve with normal precipitation patterns.

Sum of nested frequency of grasses and forbs have both increased indicating an improving trend. The most abundant grass, needle-and-thread, declined slightly in nested frequency while Salina wildrye and squirreltail both increased significantly. Perennial forbs are lacking on this site with only 5 species encountered in 1994. The only perennial forb that is very abundant is scarlet globemallow which makes up 81% of the forb cover.

TREND ASSESSMENT
soil - slightly improving
browse - stable
herbaceous understory - up

1999 TREND ASSESSMENT

Trend for soil is stable. Percent cover from herbaceous vegetation increased while cover from litter and bare ground decreased. Erosion is minimal due to the gentle slope. Trend for browse is stable. Wyoming big sagebrush has a stable density with a moderate level of recruitment (10%). Biotic potential is very low at 1%. Percent decadency only slightly increased in 1999 to 28%. A major factor that will influence the condition of the sagebrush population in the future is the level of use, associated with drought, if applicable. In 1994, no plants displayed heavy use, while 56% of the population were heavily browsed in 1999. If continued, this high level of use could cause a downward trend in the sagebrush on this critical winter range. Trend for the herbaceous understory is stable. Sum of nested frequency and cover for perennial species slightly increased since 1994. Annual species such as cheatgrass are still insignificant in the understory.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 18

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Bouteloua gracilis	$_{a}$1	$_{ab}$8	$_{b}$11	1	3	7	.06	.22
G	Bromus tectorum (a)	-	3	-	-	1	-	.00	-
G	Elymus salina	$_{a}$21	$_{b}$91	$_{b}$84	9	35	31	.67	1.79
G	Oryzopsis hymenoides	59	40	67	28	19	29	1.26	2.12
G	Sitanion hystrix	$_{b}$43	$_{b}$77	$_{a}$13	21	31	7	1.15	.28
G	Sporobolus cryptandrus	$_{a}$3	$_{b}$13	$_{a}$-	1	7	-	.39	-
G	Stipa comata	262	250	256	96	88	90	8.67	9.88
Total for Annual Grasses		0	3	0	0	1	0	0.00	0
Total for Perennial Grasses		389	479	431	156	183	164	12.24	14.31
Total for Grasses		389	482	431	156	184	164	12.24	14.31
F	Astragalus convallarius	$_{b}$10	$_{a}$-	$_{ab}$4	3	-	1	-	.00
F	Calochortus nuttallii	-	-	5	-	-	2	-	.03
F	Castilleja spp.	-	-	2	-	-	1	-	.00
F	Chenopodium leptophyllum (a)	-	$_{b}$19	$_{a}$-	-	7	-	.03	-
F	Cruciferae	6	-	-	2	-	-	-	-
F	Eriogonum alatum	-	-	2	-	-	1	-	.00
F	Eriogonum cernuum (a)	-	$_{b}$8	$_{a}$-	-	3	-	.01	-
F	Lappula occidentalis (a)	-	$_{b}$16	$_{a}$-	-	6	-	.05	-
F	Lesquerella spp.	$_{ab}$5	$_{b}$7	$_{a}$-	2	3	-	.01	-
F	Lomatium spp.	-	-	4	-	-	2	-	.01
F	Machaeranthera canescens	2	-	-	1	-	-	-	-
F	Orobanche spp.	1	-	-	1	-	-	-	-
F	Penstemon caespitosus	1	-	-	1	-	-	-	.00
F	Phlox longifolia	$_{a}$-	$_{b}$4	$_{c}$68	-	3	30	.04	.32
F	Plantago patagonica (a)	-	$_{b}$37	$_{a}$9	-	16	3	.08	.01
F	Schoencrambe linifolia	-	-	3	-	-	1	-	.00
F	Senecio multilobatus	6	5	6	3	2	3	.01	.04
F	Sphaeralcea coccinea	$_{a}$94	$_{a}$125	$_{b}$126	44	55	53	1.13	1.59
F	Taraxacum officinale	$_{a}$-	$_{b}$10	$_{a}$-	-	3	-	.01	-
F	Tragopogon dubius	3	-	-	1	-	-	-	-
F	Zigadenus paniculatus	-	-	3	-	-	1	-	.00
Total for Annual Forbs		0	80	9	0	32	3	0.18	0.01
Total for Perennial Forbs		128	151	223	58	66	95	1.22	2.02
Total for Forbs		128	231	232	58	98	98	1.40	2.04

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 18

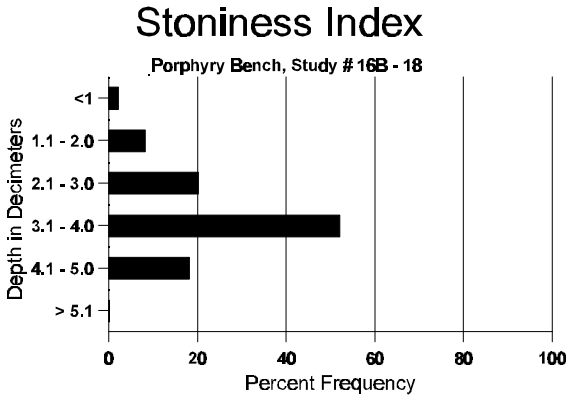
Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia tridentata wyomingensis	85	95	10.81	11.91
B	Cercocarpus ledifolius	0	0	-	-
B	Chrysothamnus viscidiflorus	0	4	-	.03
B	Gutierrezia sarothrae	3	11	.03	.10
B	Opuntia fragilis	93	93	2.96	3.74
Total for Browse		181	203	13.81	15.78

BASIC COVER --
Herd unit 16B, Study no: 18

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	327	336	5.50	27.77	31.73
Rock	1	-	0	.00	0
Pavement	29	3	0	.05	.00
Litter	386	377	49.50	35.52	29.25
Cryptogams	76	176	2.25	.90	7.30
Bare Ground	346	333	42.75	35.40	26.54

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 18, Study Name: Porphyry Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.1	58.4 (12.6)	8.1	47.3	30.2	22.6	1.1	12.3	25.6	0.6



PELLET GROUP DATA --
Herd unit 16B, Study no: 18

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	21	32	n/a
Elk	11	2	1 (2)
Deer	52	79	149 (368)
Cattle	-	1	4 (10)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 18

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	88	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
Y	88	8	4	3	-	-	-	5	-	-	18	-	1	1	1333			20
	94	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	99	13	22	2	-	-	-	2	-	-	39	-	-	-	780			39
M	88	1	13	22	-	-	-	-	-	-	36	-	-	-	2400	17	21	36
	94	215	3	-	3	-	-	-	-	-	221	-	-	-	4420	17	24	221
	99	-	16	69	4	55	78	10	-	-	232	-	-	-	4640	16	24	232
D	88	4	19	25	-	-	-	-	-	-	37	-	8	3	3200			48
	94	74	4	-	-	-	-	-	-	-	59	-	-	19	1560			78
	99	1	4	19	9	21	43	7	-	2	80	-	-	26	2120			106
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1360			68
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1740			87

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	35%	48%	13%	-11%
'94	02%	00%	06%	+18%
'99	31%	56%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	6933	Dec:	46%	
'94	6200		25%	
'99	7540		28%	

Cercocarpus ledifolius																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	1	1	-	-	-	-	-	-	2	-	-	-	133	15	8	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	33%	33%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	199	Dec:	-
'94	0		-
'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	10	5
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'88	00%		00%		00%												
	'94	00%		00%		00%												
	'99	00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'88		0	Dec:		-
													'94		0			-
													'99		100			-
Gutierrezia sarothrae																		
Y	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	28	-	-	-	-	-	-	-	-	28	-	-	-	560			28
M	88	12	-	-	-	-	-	-	-	-	12	-	-	-	800	8	4	12
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	6	7	4
	99	24	-	-	-	-	-	-	-	-	24	-	-	-	480	3	5	24
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'88	00%		00%		00%									-92%			
	'94	00%		00%		00%									+92%			
	'99	00%		00%		00%												
Total Plants/Acre (excluding Dead & Seedlings)													'88		1066	Dec:		-
													'94		80			-
													'99		1040			-
Opuntia fragilis																		
S	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	53	-	-	-	-	-	-	-	-	53	-	-	-	3533			53
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	88	63	-	-	-	-	-	-	-	-	60	-	3	-	4200	3	9	63
	94	342	-	-	-	-	-	-	-	-	342	-	-	-	6840	3	12	342
	99	316	-	-	-	-	-	-	-	-	295	-	21	-	6320	3	12	316
D	88	6	-	-	-	-	-	-	-	-	4	-	2	-	400			6
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	37	-	-	1	-	-	-	-	-	5	-	6	27	760			38
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing		Moderate Use		Heavy Use		Poor Vigor									%Change			
	'88	00%		00%		04%									-14%			
	'94	00%		00%		00%									+ 5%			
	'99	00%		00%		15%												
Total Plants/Acre (excluding Dead & Seedlings)													'88		8133	Dec:		5%
													'94		6960			1%
													'99		7360			10%

Trend Study 16B-19-99

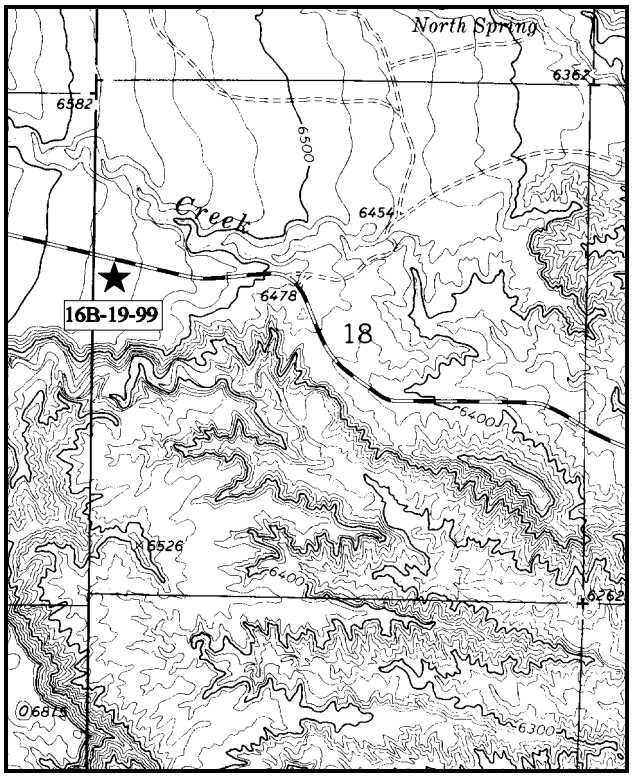
Study site name: North Spring Bench . Range type: Big Sagebrush - Grass .

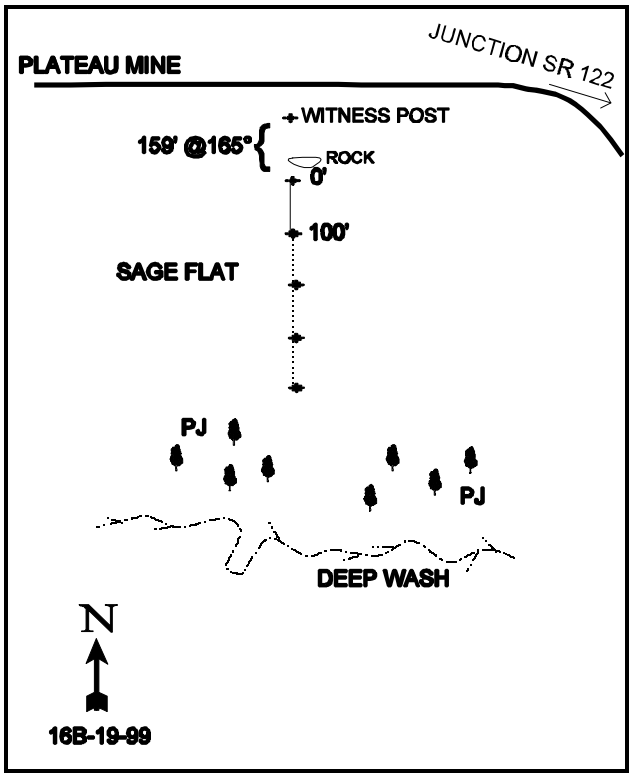
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of state highways 10 and 122 south of Price, go west on SR 122. Go 3.1 miles to a major fork. Go right towards Wattis for 5.1 miles. Look for a witness post 10 feet off the south side of the road in a sagebrush flat. The first baseline stake is 28 paces south of the witness post, and located behind a large rock. It is marked with a red browse tag (#9013). The other study posts, all 18" fenceposts, are south at 100 foot intervals.





Map Name: Pinnacle Peak Diagrammatic Sketch

Township 15S , Range 9E , Section 18 UTM 4374590.746 N, 502898.434 E

DISCUSSION

Trend Study No. 16B-19 (30-5)

The North Spring Bench trend study samples part of the critical deer winter range below Wattis in the Spring Creek area. In most years, deer occupy the area until the first of May. This southern end of the Gordon Creek sagebrush range receives heavy use by deer as evidenced by the high quadrat frequency of pellet-groups on the site. Managed by the BLM, the North Springs allotment is used by 1,000 sheep from May 1 to June 30. Deer use is currently extremely high with an estimated 159 deer days use/acre (392 ddu/ha) estimated from 1999 on site pellet group transect data. Several deer beds were found underneath large pinyon trees near the end of the sampling baseline.

The study is on a nearly level, natural sagebrush flat surrounded by mature pinyon-juniper at an elevation of 6,600 feet. Drainage and aspect is generally to the east. The soil is a sandy clay loam with a neutral pH (7.2). The soil is moderately deep with an estimated effective rooting depth of 16 inches. A stoniness index shows rock to be uniformly distributed throughout the upper 20 inches of the profile. A calcium carbonate hardpan is present about 12 inches below the surface which may be restrictive to plants roots. Surface runoff has caused plant pedestaling and moderate soil movement. However, the gentle slope and adequate vegetation and litter cover help keep erosion at a minimal level. There are no major gullies, but nearby washes show continued down cutting and active erosion. Bare ground has continually decreased since the initial reading in 1988.

The key browse species is Wyoming big sagebrush. Although the shrubs displayed fair leader growth, there were many indicators of a downward trend during the 1988 and 1994 readings. The population declined by 24% between 1988 and 1994, however much of this change can be attributed to the much larger sample size which began in 1994 giving significantly improved population estimates for discontinuous browse distributions. One should probably pay more attention to other measured parameters. For example, over half the population was decadent (52% in 1988, and 62% in 1994), and one in four shrubs was classified as dead. The majority of the moderately dense population was mature, with very few young in either 1988 or 1994. During the 1994 reading more seedlings were encountered but the number of young declined by almost half. Use was heavy in 1988 with 32% of the population classified as heavily browsed. In 1994, only 8% showed heavy use. Vigor declined however, from 10% with poor vigor in 1988 to 27% by 1994. Currently, the population of Wyoming big sagebrush appears to be improving. In 1999, percent decadency decreased from 62% to 31%, and plants with poor vigor decreased from 27% to 14%. Biotic potential is good at 12%, and recruitment from young plants is high at 23%. The proportion of decadent plants classified as dying also slightly decreased in 1999, from 43% to 36%. One area of concern is that use increased again in 1999 with heavy use displayed on 48% of the population. Continued heavy use, coupled with other environmental parameters, could cause the current improvements to reverse the improving trend in the future.

Increaser species, most notably broom snakeweed, was very abundant in 1988 (17,266 plants/acre) and age class composition indicated an increasing population. Due to the recent drought conditions, snakeweed died off in large numbers in 1994 with only 860 plants/acre being estimated. In 1999, the population drastically increased to an estimated 16,500 plants/acre with most of these being mature plants. The return to more normal precipitation patterns in recent years is most likely one of the main catalysts for this increase. Prickly pear is also quite abundant with the population currently estimated at 4,900 plants/acre.

Pinyon and juniper trees surround the site and are encroaching into the sagebrush flat. Point quarter data taken during the 1999 reading estimate a density of 100 pinyon trees/acre, and 19 juniper trees/acre. Average stem diameter for pinyon is 2 1/8 inches, while that of juniper is 2 2/3 inches.

The abundant and vigorous warm-season grass, blue grama, is not an important forage source on this site, although it does provide good ground cover. In 1994, it provided over 6% cover, in 1999, it provided just under 6% cover. Other perennial grasses that are common include: western wheatgrass, Indian ricegrass, and

bottlebrush squirreltail. Western wheatgrass is the most abundant species in sum of nested frequency and quadrat frequency. It also provides the second highest cover of the grasses. Needle-and-thread significantly decreased in 1999 as it was only sampled in one quadrat. Forbs are not significant at this site, currently providing less than 1% cover.

1994 TREND ASSESSMENT

Ground cover characteristics have improved on this site. Vegetation cover is quite high for a Wyoming big sagebrush site. Even though grasses and forbs make up only 33% of the vegetation cover, it appears to be evenly dispersed. Percent cover of litter has improved from 27% to 34%. The high sum of nested frequency for litter indicates well dispersed litter cover. Percent bare ground declined from 53% to 47%. Erosion on the site is minimal due to the protective cover combined with the gentle terrain. Even with decreased heavy use on the Wyoming big sagebrush, the browse trend is down because the sagebrush community has increased percent decadence (52-62%), the proportion of shrubs in poor vigor has increased (10-27%), and there is one dead plant in every five. Trend for herbaceous understory has also declined since 1988. Sum nested frequency of perennial grasses and forbs have declined. Normal precipitation patterns will likely reverse this trend.

TREND ASSESSMENT
soil - improving
browse - down
herbaceous understory - down slightly

1999 TREND ASSESSMENT

Trend for soil is slightly improved. Some soil movement is apparent, but the gentle terrain keeps erosion at minimal levels directly on the site. Vegetation cover increased and bare ground decreased. Trend for browse is stable overall. The key species, Wyoming big sagebrush, shows improving trends with decreased decadency from 62% to 31%. Plants displaying poor vigor also decreased from 27% to 14%. Recruitment from young plants is currently high at 23%, and biotic potential is moderate at 12%. The main concern is that heavy use increased to 48%. This species is stable at the present time, but with continued heavy use (and drought), these improvements will most likely reverse current trend. Broom snakeweed drastically increased in 1999 due to more normal precipitation patterns in recent years. The herbaceous understory trend is stable. Sum of nested frequency for perennial species increased in 1999. Perennial grasses dominate the herbaceous component at this site.

TREND ASSESSMENT
soil - slightly improved, but still only fair condition
browse - stable for the key species Wyoming big sagebrush
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 19

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron smithii	$_{a}$99	$_{a}$125	$_{b}$171	34	42	61	.85	2.81
G	Bouteloua gracilis	$_{b}$213	$_{a}$147	$_{a}$136	74	49	49	6.20	5.74
G	Bromus tectorum (a)	-	$_{a}$7	$_{b}$96	-	3	35	.01	.88
G	Oryzopsis hymenoides	$_{a}$37	$_{a}$23	$_{b}$64	19	11	28	.22	1.22
G	Sitanion hystrix	$_{b}$153	$_{a}$76	$_{a}$80	65	30	38	1.57	1.72
G	Sporobolus cryptandrus	$_{a}$-	$_{b}$9	$_{a}$-	-	3	-	.04	-
G	Stipa columbiana	-	-	-	-	-	-	-	.00
G	Stipa comata	$_{b}$35	$_{b}$35	$_{a}$1	18	18	1	.36	.15
Total for Annual Grasses		0	7	96	0	3	35	0.01	0.87
Total for Perennial Grasses		537	415	452	210	153	177	9.26	11.65
Total for Grasses		537	422	548	210	156	212	9.27	12.53
F	Astragalus convallarius	-	-	3	-	-	1	-	.00
F	Caulanthus crassicaulis	2	-	-	2	-	-	-	-
F	Castilleja linariaefolia	-	-	1	-	-	1	-	.03
F	Castilleja spp.	-	-	1	-	-	1	-	.03
F	Chaenactis douglasii	-	-	1	-	-	1	-	.00
F	Cymopterus spp.	-	-	1	-	-	1	-	.00
F	Descurainia pinnata (a)	-	$_{b}$19	$_{a}$5	-	7	2	.03	.01
F	Eriogonum cernuum (a)	-	5	-	-	2	-	.03	-
F	Erigeron spp.	3	-	-	1	-	-	-	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{b}$15	-	-	7	-	.06
F	Phlox longifolia	$_{a}$11	$_{a}$1	$_{b}$47	6	1	21	.00	.15
F	Plantago patagonica (a)	-	$_{a}$10	$_{b}$50	-	5	21	.02	.15
F	Schoencrambe linifolia	-	-	22	-	-	8	-	.04
F	Sphaeralcea coccinea	$_{ab}$23	$_{a}$23	$_{b}$48	11	11	20	.05	.17
F	Thermopsis montana	-	-	1	-	-	1	-	.00
F	Townsendia spp.	-	-	2	-	-	1	-	.00
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Annual Forbs		0	34	70	0	14	30	0.09	0.22
Total for Perennial Forbs		40	24	127	21	12	56	0.05	0.46
Total for Forbs		40	58	197	21	26	86	0.15	0.68

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 19

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia tridentata wyomingensis	86	95	12.75	13.66
B	Atriplex canescens	0	1	-	-
B	Chrysothamnus spp.	0	0	-	-
B	Gutierrezia sarothrae	28	88	.08	3.01
B	Juniperus osteosperma	0	0	1.25	-
B	Opuntia fragilis	75	76	1.29	2.41
B	Pinus edulis	0	3	3.08	4.51
Total for Browse		189	263	18.48	23.60

CANOPY COVER --
Herd unit 16B, Study no: 19

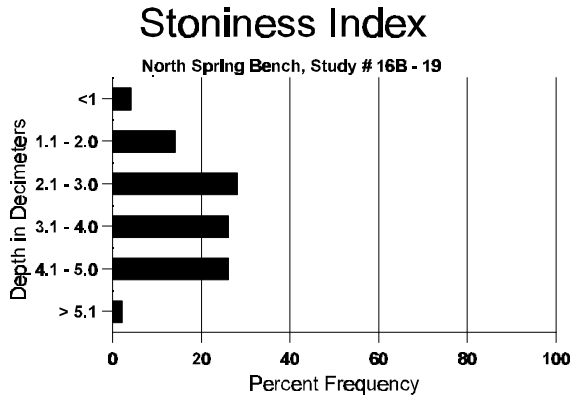
Species	Percent Cover '99
Pinus edulis	10

BASIC COVER --
Herd unit 16B, Study no: 19

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	315	331	12.25	26.72	36.40
Rock	88	25	1.25	1.11	.79
Pavement	101	77	.25	.20	.27
Litter	396	382	27.25	34.23	32.38
Cryptogams	107	211	6.50	2.03	8.32
Bare Ground	342	339	52.50	46.56	36.29

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 19, Study Name: North Spring Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.0	56.4 (15.6)	7.2	57.3	20.2	22.6	1.2	10.9	51.2	0.6



PELLET GROUP DATA --
Herd unit 16B, Study no: 19

Type	Quadrat Frequency ⁞94	Quadrat Frequency ⁞99	Pellet Transect Days Use/Acre (ha) ⁞99
Rabbit	45	54	n/a
Elk	4	-	0
Deer	76	82	159 (393)
Cattle	0	0	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 19

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	59	-	-	-	-	-	-	-	-	56	-	3	-	1180			59
	99	27	-	5	6	-	-	-	-	-	36	-	-	-	760			38
Y	88	2	2	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	45	8	3	5	9	2	2	-	-	74	-	-	-	1480			74
M	88	1	23	14	1	-	-	1	-	-	40	-	-	-	2666	14	18	40
	94	43	34	5	-	-	-	-	-	-	81	-	-	1	1640	37	35	82
	99	7	-	-	-	14	96	28	-	-	139	1	5	-	2900	17	26	145
D	88	9	22	14	-	1	1	-	-	-	38	-	2	7	3133			47
	94	48	79	14	-	-	-	-	-	-	80	-	-	61	2820			141
	99	3	1	-	-	16	52	24	-	-	57	-	3	36	2000			100
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1180			59
	99	-	-	-	1	-	-	-	-	-	-	-	-	1	1640			82

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	53%	32%	10%	-24%
'94	49%	08%	27%	+28%
'99	15%	48%	14%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	6065	Dec:	52%	
'94	4580		62%	
'99	6380		31%	

Atriplex canescens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	0		-
'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus spp.																		
Y	88	-	-	-	-	-	-	1	-	-	-	-	1	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	2	-	-	-	-	-	-	-	2	-	-	-	133	6	5	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	67%	00%	33%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	199	Dec:	-
	'94	0		-
	'99	0		-

Gutierrezia sarothrae																		
S	88	18	-	-	-	-	-	-	-	-	18	-	-	-	1200			18
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	51	-	-	-	-	-	-	-	-	51	-	-	-	1020			51
Y	88	71	-	-	-	-	-	-	-	-	71	-	-	-	4733			71
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	99	156	27	3	10	-	-	-	-	-	193	-	-	3	3920			196
M	88	166	10	2	-	-	-	1	-	-	178	1	-	-	11933	7	5	179
	94	32	-	-	-	-	-	-	-	-	32	-	-	-	640	6	6	32
	99	562	47	-	18	-	-	-	-	-	627	-	-	-	12540	4	6	627
D	88	8	-	-	1	-	-	-	-	-	8	-	1	-	600			9
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	.77%	.38%	-95%
'94	00%	00%	00%	+95%
'99	09%	.36%	.60%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	17266	Dec:	3%
	'94	860		2%
	'99	16500		0%

Juniperus osteosperma																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia fragilis																		
Y	88	35	-	-	-	-	-	-	-	-	32	-	3	-	2333			35
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	99	36	-	-	1	-	-	-	-	-	37	-	-	-	740			37
M	88	56	-	-	-	-	-	-	-	-	42	-	12	2	3733	2	4	56
	94	232	-	-	-	-	-	-	-	-	232	-	-	-	4640	2	8	232
	99	190	-	-	-	-	-	-	-	-	160	1	29	-	3800	2	6	190
D	88	17	-	-	-	-	-	-	-	-	10	-	5	2	1133			17
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	17	-	-	1	-	-	-	-	-	1	-	1	16	360			18
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	22%	-33%
'94	00%	00%	00%	+ 2%
'99	00%	00%	19%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	7199	Dec:	16%
	'94	4800		0%
	'99	4900		7%

Pinus edulis																		
Y	88	1	2	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	1	-	-	-	-	1	-	-	-	66	109	118	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	75%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	266	Dec:	-
	'94	0		-
	'99	60		-

Trend Study 16B-20-99

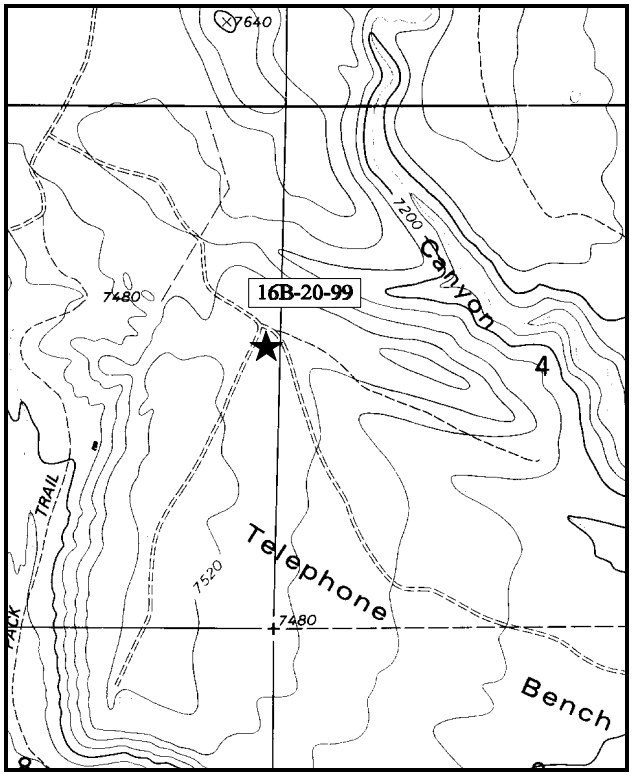
Study site name: Telephone Bench . Range type: Big Sagebrush - Grass .

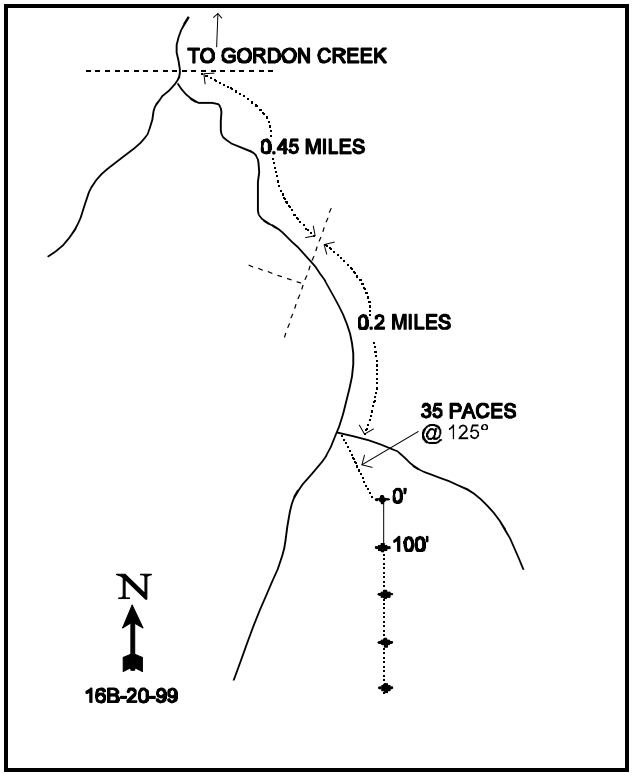
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of US 6 and the Consumers Road south of Helper, go 3.5 miles to a railroad crossing. Continue up the oiled road 6.0 miles. Turn left onto a dirt road, cross Gordon Creek and proceed approximately 2.3 miles to a cattleguard. Go 1.2 miles to a wire fence. Just beyond the fence, turn left at the fork and go 0.45 miles to another fence. Continue on 0.2 miles to a fork at the top of the hill. The study site is between the forks. The 0-foot baseline stake is 35 paces southeast of fork. The study is marked by cut green fenceposts about 18" tall.





Map Name: Jump Creek Diagrammatic Sketch

Township 14S ,Range 8E , Section 5 UTM 4387379.745 N, 496438.981 E

DISCUSSION

Trend Study No. 16B-20 (30-6)

The Telephone Bench is on Division owned winter range located on Telephone Bench, southwest of Price. This study samples a big sagebrush/grass type on the northern end of Telephone Bench. At one time, the area was heavily grazed by cattle, but currently no livestock grazing is permitted. Data from a nearby pellet group transect indicates widely fluctuating deer use. During the 1990-91 winter, 125 deer days use/hectare were estimated. This number dropped to only 12 ddu/ha in 1992-93. During the winter of 1994-95, there was an estimated 42 ddu/ha. The 1999 pellet transect data read on the study area indicated light to moderate use by deer, but high use by elk. Deer use was estimated at 19 days use/acre (48 ddu/ha), and elk use at 72 days use/acre (179 edu/ha). One cattle pat was sampled during 1999.

On top of the bench, the elevation is 7,360 feet. The land faces east-northeast with an average slope of 5%. Compared to other deer winter range sites studied in the area, the higher elevation at this site affords more precipitation resulting in the presence of mountain big sagebrush intermixed with black sagebrush. The soil is somewhat shallow as black sagebrush predominates (estimated effective rooting depth of 11 inches), but there are some deeper areas allowing mountain big sagebrush to occur. The soil is a dense clay loam with a slightly alkaline pH (7.4). Phosphorus is low at 5.7 ppm where 10 ppm has been shown necessary for normal plant growth and development. There is moderate localized erosion on the site with some pedestaling noted around the base of the shrubs. Litter cover substantially decreased in 1999 which could cause increased erosion in the future, especially during severe thunderstorms.

The most abundant shrub on the site is black sagebrush which had a density of 6,932 plants/acre in 1988 and 6,680 in 1994. The current density is estimated at 6,840 plants/acre, with 70% of the population classified as mature. Further age class analysis indicates the potential for this species to expand with a high biotic potential (21%) and recruitment from young plants (16%). Percent decadency substantially decreased from 55% in 1994 to 15% in 1999. Apparently, many of the plants classified as decadent in 1994 regained their vigor and were classified as mature plants with normal vigor in 1999. The proportion of the population displaying poor vigor decreased from 34% in 1994, to 3% in 1999. The drought conditions probably accounted for a lot of the high decadency and poor vigor of black sage during the 1994 reading. It appears that more normal precipitation patterns in the past few years have reversed the downward trends for black sagebrush.

Mountain big sagebrush currently has a low population density on this site. There were only 466 plants/acre in 1988, and 180 by 1994. The population is currently estimated at 360 plants/acre. The available mature shrubs were heavily hedged in 1988, mostly moderately utilized in 1994, with heavy use increasing to 28% in 1999. Poor vigor was displayed on 11% of the population in both 1994 and 1999. Seed production has been low with few seedlings encountered in 1994, however, seedlings were estimated at 120 plants/acre in 1999. This is likely a marginal site for big sagebrush due to soil conditions, and when coupled with drought, has caused a decline in population density. Improved precipitation should help to increase reproduction for mountain big sagebrush in the future. There are a few scattered serviceberry on the site which receive moderate to heavy use. The height and crown diameter for serviceberry dropped significantly in 1999 on this marginal site. Dwarf rabbitbrush and broom snakeweed are very abundant, currently estimated at 6,260 plants/acre and 5,940 plants/acre respectively. These species appear to have stabile populations as over 90% of their populations are classified as mature. Use is mostly light on both.

Grasses are the dominate type as they provide over half of the total vegetative cover in both 1994 and 1999. Identification of grasses in past readings resulted in several species being “lumped” together including: bluebunch and slender wheatgrass, and mutton and Sandberg bluegrass. These species were separated in the 1999 reading. Slender wheatgrass was the most prominent species accounting for 55% of the grass cover in 1994. This species is actually much less abundant, with bluebunch wheatgrass being the dominant species

after they were separated in 1999. Bluebunch wheatgrass currently provides 60% of the grass cover and 32% of the total vegetative cover. Mutton bluegrass, which also was very abundant in past readings greatly decreased due to the splitting of this species with Sandberg bluegrass. Currently, Sandberg bluegrass is the second most abundant species in nested and quadrat frequency. Salina wildrye is also present and provides 19% of the grass cover in 1999. Grasses are vigorous, with mutton bluegrass showing some utilization. Forbs are diverse, with many species being moderately frequent, however no one species is particularly dominant. Twenty perennial forbs were sampled in 1999.

1994 TREND ASSESSMENT

Ground cover characteristics have remained basically stable since the last reading. The abundant herbaceous ground cover and litter cover adequately protect the soil on the site. Due in part to drought conditions, mountain big sagebrush and serviceberry are not doing well on this marginal site. Black sagebrush, the key browse species, is also suffering the effects of drought. It has a stable population density at the present time, however percent decadency has increased (from 45 to 55%), coupled with the reduced vigor (those with poor vigor have gone from 10 to 34%), there has also been an increase in percentage of decadent plants classified as dying (from 9 to 50%). All of these downward indicators indicate a decline in population density in the future if current drought conditions persist. These factors, and the abundance of increaser rabbitbrush and broom snakeweed, combine to cause a slightly downward browse trend on this site. Like many of the sites on this unit, the herbaceous understory trend is mixed. Sum of nested frequency for grasses increased 66% while those of forbs declined 63%. Combined nested frequencies of grasses and forbs combined remained fairly stable indicating a stable trend.

TREND ASSESSMENT
soil - stable
browse - slightly down
herbaceous understory - stable overall, up for grasses and down for forbs

1999 TREND ASSESSMENT

Trend for soil is stable. While percent litter substantially decreased, vegetative cover increased, and bare ground decreased. Herbaceous vegetation provides 64% of the vegetation cover at the site with most of this coming from perennial species which are good at holding soils in place. Evidence of erosion is slight at the present time, although it could increase in the future with a continuing decline in litter cover. Trend for browse is slightly up. Many of the browse parameters measured showed a declining trend 5 years ago due to drought. With better moisture in the past few years, these parameters currently are showing improvement. Percent decadency for black sagebrush has declined from 55% to 15%, with many of the decadent plants regaining their vigor and being classified as mature with normal vigor in 1999. Biotic potential and recruitment are high, increasing to 21% and 16% respectively. Use has increased however, with 40% of the population showing moderate use. Mountain big sagebrush is not particularly abundant, although density increased in 1999, and biotic potential is currently high at 33%. Percent decadency also decreased from 33% in 1994 to 17% in 1999. One negative aspect is the abundance of broom snakeweed. Trend for the herbaceous understory is stable. Although sum of nested frequency for perennial species declined as a whole, perennial grass nested frequency increased. Since grasses make up over half of the total vegetative cover at the site, trend is stable for herbaceous species.

TREND ASSESSMENT
soil - stable
browse - slightly up
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 20

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	a-	a-	b239	-	-	79	-	12.92
G	Agropyron trachycaulum	b265	b238	a72	90	79	27	8.94	.72
G	Bouteloua gracilis	15	13	22	5	4	10	.48	.46
G	Elymus salina	a-	b65	b78	-	24	31	2.37	4.17
G	Koeleria cristata	-	3	3	-	2	1	.01	.03
G	Oryzopsis hymenoides	-	3	3	-	1	1	.00	.00
G	Poa fendleriana	b95	c250	a36	45	91	18	4.42	.41
G	Poa secunda	a-	a-	b156	-	-	67	-	2.30
G	Sitanion hystrix	16	26	22	8	12	11	.13	.44
G	Stipa comata	4	-	-	2	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		395	598	631	150	213	245	16.36	21.48
Total for Grasses		395	598	631	150	213	245	16.36	21.48
F	Agoseris glauca	a-	a-	b5	-	-	3	-	.04
F	Antennaria rosea	b59	b46	a15	27	19	8	.90	.26
F	Arabis spp.	8	2	4	4	1	2	.00	.01
F	Astragalus convallarius	b91	a40	a52	42	18	24	.14	.77
F	Astragalus tenellus	10	1	9	4	1	7	.00	.64
F	Balsamorhiza hookeri	b22	a-	a-	11	-	-	-	-
F	Castilleja chromosa	b137	a21	a29	62	13	14	.06	.19
F	Calochortus nuttallii	-	4	3	-	2	1	.01	.00
F	Comandra pallida	20	24	31	7	10	11	.15	.37
F	Collinsia parviflora (a)	-	3	-	-	1	-	.00	-
F	Crepis acuminata	a2	b36	a1	1	19	1	.26	.03
F	Descurainia pinnata (a)	-	3	1	-	1	1	.00	.03
F	Erigeron eatonii	b64	a37	a15	32	18	7	.19	.04
F	Eriogonum jamesii	11	12	10	7	5	5	.34	.24
F	Gilia spp. (a)	-	4	-	-	2	-	.01	-
F	Hymenoxys acaulis	10	-	4	5	-	2	-	.06
F	Lappula occidentalis (a)	-	3	-	-	1	-	.00	-
F	Lesquerella spp.	a20	ab47	b63	10	21	27	.10	.48
F	Lomatium spp.	-	6	1	-	3	1	.01	.03
F	Machaeranthera grindelioides	26	11	15	10	6	6	.03	.39
F	Paronychia sessiliflora	b10	a-	a-	4	-	-	-	-
F	Penstemon watsonii	45	38	50	22	21	22	.10	.79
F	Phlox longifolia	c175	b119	a8	72	54	3	.27	.01
F	Polygonum douglasii (a)	-	2	-	-	1	-	.00	-
F	Senecio multilobatus	2	-	5	2	-	2	-	.01

Type	Species	Nested Frequency '88	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '88	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
F	Sphaeralcea coccinea	$_{a}$1	$_{ab}$5	$_{b}$20	1	3	8	.06	.09
F	Trifolium gymnocarpon	30	16	3	18	8	1	.04	.00
Total for Annual Forbs		0	15	1	0	6	1	0.02	0.03
Total for Perennial Forbs		743	465	343	341	222	155	2.71	4.48
Total for Forbs		743	480	344	341	228	156	2.74	4.51

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 20

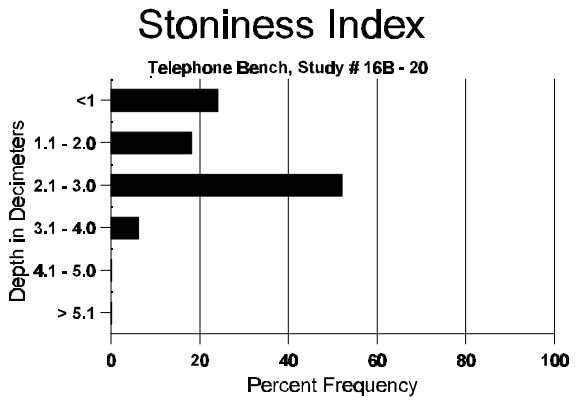
Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Amelanchier utahensis	9	10	.56	.38
B	Artemisia nova	94	96	5.24	7.77
B	Artemisia tridentata vaseyana	8	12	.83	.03
B	Chrysothamnus depressus	84	80	2.48	4.32
B	Chrysothamnus nauseosus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	48	38	.90	.66
B	Eriogonum corymbosum	3	5	.03	.09
B	Gutierrezia sarothrae	54	68	1.54	1.50
B	Opuntia spp.	2	0	.00	-
B	Pediocactus simpsonii	1	1	.01	-
B	Sambucus cerulea	0	0	-	-
B	Tetradymia canescens	2	5	-	.00
Total for Browse		305	315	11.61	14.75

BASIC COVER --
Herd unit 16B, Study no: 20

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	344	345	14.00	32.61	37.92
Rock	107	59	4.25	2.26	1.97
Pavement	148	95	1.00	.54	.61
Litter	395	365	42.00	42.15	24.82
Cryptogams	142	176	3.75	4.62	6.30
Bare Ground	350	317	35.00	34.70	31.67

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 20, Study Name: Telephone Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.2	54.8 (12.4)	7.4	38.4	29.8	31.8	1.7	5.7	83.2	0.5



PELLET GROUP DATA --
Herd unit 16B, Study no: 20

Type	Quadrat Frequency '94	Quadrat Frequency '99
Sheep	-	1
Rabbit	20	6
Elk	51	37
Deer	18	16
Cattle	0	0

Pellet Transect Days Use/Acre (ha) '99
0
n/a
179 (442)
19 (47)
1 (2)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 20

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	88	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	1	2	4	-	-	-	-	-	-	7	-	-	-	466			7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	4	1	-	-	1	-	-	-	9	-	-	-	180	63	88	9
	99	-	-	6	-	-	1	-	-	-	7	-	-	-	140	24	28	7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	29%	57%	00%	-61%
'94	44%	22%	00%	+10%
'99	30%	70%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	466	Dec:	-
	'94	180		-
	'99	200		-

Artemisia nova																		
S	88	35	-	-	1	-	-	-	-	-	36	-	-	-	2400			36
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	73	-	-	-	-	-	-	-	-	73	-	-	-	1460			73
Y	88	28	-	-	-	-	-	-	-	-	28	-	-	-	1866			28
	94	22	23	-	-	-	-	-	-	-	45	-	-	-	900			45
	99	50	1	3	-	-	-	-	-	-	54	-	-	-	1080			54
M	88	26	3	-	-	-	-	-	-	-	27	-	2	-	1933	10	12	29
	94	69	31	3	1	-	-	-	-	-	100	-	-	4	2080	9	14	104
	99	78	119	41	-	-	-	-	-	-	236	-	2	-	4760	8	16	238
D	88	38	8	-	1	-	-	-	-	-	39	-	4	4	3133			47
	94	119	58	1	-	5	-	2	-	-	75	-	-	110	3700			185
	99	24	17	6	-	-	3	-	-	-	43	-	-	7	1000			50
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1920			96
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1580			79

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	11%	00%	10%	- 4%
'94	35%	01%	34%	+ 2%
'99	40%	15%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	6932	Dec:	45%
	'94	6680		55%
	'99	6840		15%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	88	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	2	-	-	-	-	-	-	2	-	-	-	133	11	12	2
	94	2	4	-	-	-	-	-	-	-	6	-	-	-	120	18	21	6
	99	2	8	3	-	-	-	-	-	-	13	-	-	-	260	14	19	13
D	88	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	3	-	-	-	-	-	-	-	2	-	-	1	60			3
	99	-	-	2	-	1	-	-	-	-	1	-	-	2	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	14%	57%	00%	-61%
'94	78%	00%	11%	+50%
'99	50%	28%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	466	Dec:		29%
'94	180			33%
'99	360			17%

Chrysothamnus depressus																		
S	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	34	-	-	-	-	-	-	-	-	34	-	-	-	680			34
Y	88	33	-	-	-	-	-	-	-	-	32	-	1	-	2200			33
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	16	-	-	-	-	-	-	-	-	15	-	-	-	320			16
M	88	40	1	1	-	-	-	-	-	-	41	-	1	-	2800	5	7	42
	94	301	-	-	-	-	-	-	-	-	301	-	-	-	6020	4	8	301
	99	232	60	-	-	-	-	-	-	-	292	-	-	-	5880	4	10	294
D	88	2	-	-	-	-	-	-	-	-	1	-	-	1	133			2
	94	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	01%	01%	04%	+16%
'94	00%	00%	.32%	+ 2%
'99	19%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	5133	Dec:		3%
'94	6140			1%
'99	6260			1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus nauseosus																		
D	88	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	100%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	100%
	'94	0		0%
	'99	0		0%

Chrysothamnus viscidiflorus viscidiflorus																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	29	-	-	-	-	-	-	-	-	29	-	-	-	1933			29
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	50	2	-	-	-	-	1	-	-	53	-	-	-	3533	4	6	53
	94	121	-	-	-	-	-	-	-	-	121	-	-	-	2420	4	10	121
	99	78	1	-	-	-	-	-	-	-	79	-	-	-	1580	5	10	79
D	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	02%	00%	00%	-55%
'94	00%	00%	00%	-37%
'99	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	5599	Dec:	2%
	'94	2520		1%
	'99	1600		0%

Eriogonum corymbosum																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	1	-	-	-	-	-	-	-	3	-	-	-	60	13	27	3
	99	8	1	-	-	-	-	-	-	-	9	-	-	-	180	10	18	9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	33%	00%	00%	+67%
'99	11%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	60		-
	'99	180		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	88	5	-	-	-	-	-	1	-	-	6	-	-	-	400			6
	94	25	-	-	-	-	-	-	-	-	25	-	-	-	500			25
	99	22	-	-	-	-	-	-	-	-	22	-	-	-	440			22
M	88	6	-	-	-	-	-	-	-	-	6	-	-	-	400	5	4	6
	94	114	-	-	-	-	-	-	-	-	82	-	-	-	2280	5	6	114
	99	275	-	-	-	-	-	-	-	-	275	-	-	-	5500	6	7	275
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	15	-	-	-	-	-	-	-	-	3	-	-	1	300			15
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+74%
'94	00%	00%	.64%	+48%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	800	Dec:	0%
	'94	3080		10%
	'99	5940		0%

Opuntia spp.																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	2	7	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	40		-
	'99	0		-

Pediocactus simpsonii																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20	6	3	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+ 0%
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sambucus cerulea																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	2	11	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66	12	16	1
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	11	14	2
	99	3	1	-	-	-	-	-	-	-	4	-	-	-	80	8	16	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	-39%
'94	00%	00%	00%	+60%
'99	20%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	40		-
	'99	100		-

Trend Study 16B-21-99

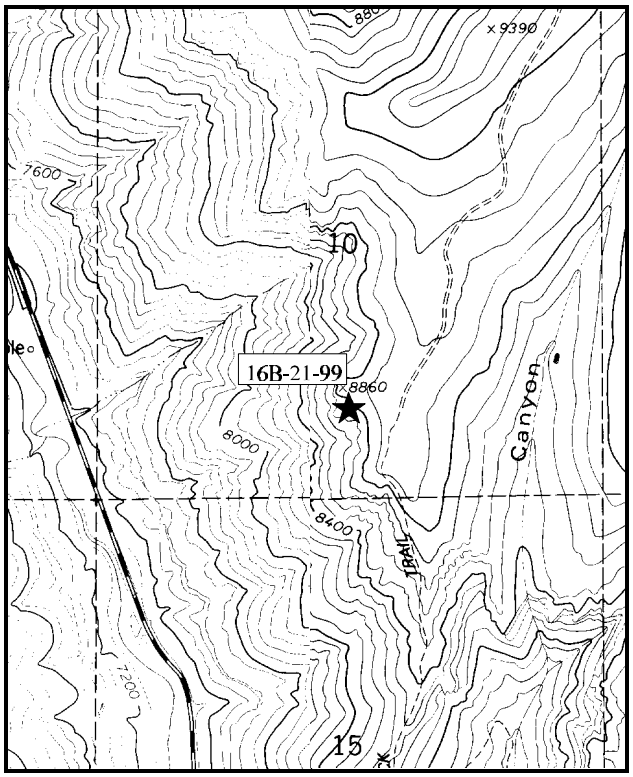
Study site name: Huntington Canyon . Range type: Perennial Grass .

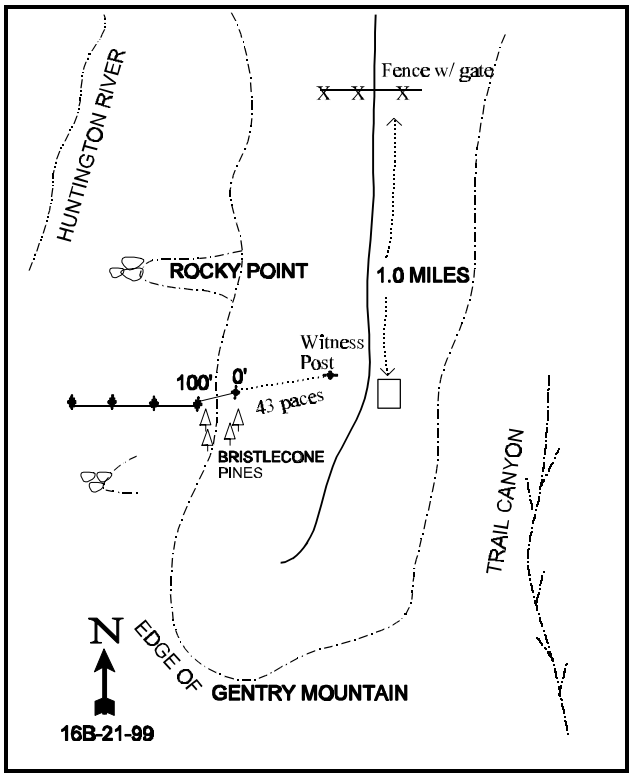
Compass bearing: frequency baseline Line 1-235°M, Lines 2-4-248°M.

Footmark (first frame placement) 5 feet, foot marks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the ghost town of Mohrland, proceed past the coal loadout and up Cedar Creek. Go 4.5 miles to the top of Gentry Mountain and a three-way junction. Take the middle road (#252) and go 0.1 mile to a fence and cattleguard at the Forest Boundary. Continue 0.65 miles to a fork with a sign, and turn right toward McCadden Hollow. Go 0.7 miles to a cattleguard. Continue 2.1 miles on the main road, passing a few minor forks, to a gated fence. Continue down the road for one mile. There is a witness post on the right. Walk west from the road 43 paces to the edge by a patch of bristlecone pine. The 0' stake is just north of these trees.





Map Name: Hiawatha

Diagrammatic Sketch

Township 16S , Range 7E , Section 10

UTM 4365594.881 N, 489475.494 E

DISCUSSION

Trend Study No. 16B-21 (30-7)

The Huntington Canyon study samples a very steep Salina wildrye slope on the east side of Huntington Canyon. The windswept ridgetops and steep sidehills are important winter range for the elk on Gentry Mountain. Adjacent stands of curlleaf mountain mahogany show signs of elk use. Although the stands provide good thermal cover, much of the forage is unavailable because the mature trees are highlined. The land is managed by the Forest Service. Although 1,440 cows graze Gentry Mountain during the summer (June 27 to September 30), they very seldom use the steep side hills near the study site. Wildlife use is mostly by elk, with light deer use. Pellet group transect data in 1999 estimate 53 elk days use/acre (131 edu/ha), and 3 deer days use/acre (7 ddu/ha) on the site.

The slope on the study site is variable from 35% to over 50% in some places. It has a west-southwest aspect and an elevation of 8,800 feet. The soil is very rocky on the surface with rock and pavement fragments loose and easily dislodged downslope. The soil is moderately deep beneath the rock with an estimated effective rooting depth of 16 inches. Soil texture is a clay loam with a slightly alkaline pH (7.5). Both potassium (64 ppm) and phosphorus (2.8 ppm) are below the minimum levels that have been shown necessary for normal plant growth and development (70 ppm and 10 ppm respectively). The steep slope and rocky surface increases runoff, but armor the soil from severe erosion.

There is little browse directly on the study site. There were scattered young mahogany that showed evidence of heavy browsing in 1988. Currently, curlleaf mahogany number 80 plants/acre on the site. Mountain big sagebrush are also found on the site, but the density was moderately low at 820 plant/acre in 1999. It averages less than two feet tall, and shows only light to moderate hedging. This species appears to be stable with a mostly mature population and low recruitment. Biotic potential is currently zero. The most numerous shrubs are broom snakeweed and fringed sagebrush. Fringed sagebrush is expanding with a 25% increase in density, and a high biotic potential (18%) and recruitment level (24%) in 1999. If available, the fringed sagebrush can be nutritious, palatable winter forage. Moderate use was sampled on 20% of the population in 1999. Broom snakeweed is stable with 89% of the population being mature.

Salina wildrye dominates the plant community on the steep upper slopes with a quadrat frequency of over 80% in all sampling years. It currently provides 99% of the grass cover, 59% of the herbaceous cover, and 40% of the total vegetative cover at the site. There was some evidence of grazing in the past, but generally the large bunch grass is choked with old growth and a substantial build-up of litter. Other grasses and forbs are relatively uncommon, except for a large *Astragalus* that was called timber poisonvetch. This species currently provides 22% of the herbaceous cover and 15% of the total vegetative cover.

1994 TREND ASSESSMENT

Soil trend is currently stable with similar ground cover characteristics in 1994 compared to 1988. The well dispersed bunch grasses combined with the extensive rock and pavement cover adequately protect the soil. Useful browse is lacking on this site but those that do exist display stable trends. Sum of nested frequency for grasses increased while those of forbs declined. Nested frequency of Salina wildrye increased significantly. Combined nested frequencies of grasses and forbs remained about the same. Trend for herbaceous understory is currently stable.

TREND ASSESSMENT
soil - stable
browse - stable but lacking
herbaceous understory - stable, up for grasses and down for forbs

1999 TREND ASSESSMENT

Trend for soil is stable. Bare ground cover decreased in 1999, with vegetation cover increasing. Erosion continues to be held in check with abundant rock and pavement cover even with the extremely steep slope. Browse trend is stable. Mountain big sagebrush is the most abundant key species and increased in density in 1999, however, recruitment is low at the present time. Percent decadency increased from 7% to 20% in 1999, with 40% of the population displaying moderate use. Fringed sagebrush is the most abundant species in number, increasing to 2,300 plants/acre in 1999. This species can be a palatable browse source if not buried too deep under winter snows, but not critical for a site that is normally too high for deer and mostly utilized by elk. The herbaceous understory is stable with perennial sum of nested frequency increasing in 1999. Overall, Salina wildrye dominates, and diversity is lacking.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable but lacking diversity

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 21

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron intermedium	-	3	-	-	1	-	.00	-
G	Elymus salina	222	252	237	85	84	83	12.20	12.80
G	Poa fendleriana	a-	b12	b17	-	4	7	.24	.11
G	Poa secunda	-	1	3	-	1	1	.00	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		222	268	257	85	90	91	12.45	12.93
Total for Grasses		222	268	257	85	90	91	12.45	12.93
F	Agoseris spp.	7	-	-	3	-	-	-	-
F	Antennaria rosea	4	-	-	1	-	-	-	-
F	Arenaria spp.	8	6	-	4	3	-	.01	-
F	Astragalus convallarius	a-	b9	c97	-	5	41	.12	4.75
F	Astragalus coltoni	b82	a-	a-	37	-	-	-	-
F	Astragalus tenellus	12	27	9	7	11	4	1.16	.69
F	Chaenactis douglasii	11	2	12	5	1	7	.00	.06
F	Hymenoxys acaulis	b65	a19	a17	28	9	8	.05	.16
F	Hymenoxys richardsonii	a63	b97	ab91	32	48	46	1.93	1.85
F	Lesquerella spp.	-	-	1	-	-	1	-	.00
F	Lupinus spp.	-	-	-	-	-	-	.00	.06
F	Machaeranthera grindelioides	a14	ab19	b30	7	10	15	.17	.98
F	Penstemon spp.	-	1	1	-	1	1	.01	.00
F	Phlox spp.	-	-	4	-	-	2	-	.15
F	Unknown forb-perennial	1	-	-	1	-	-	-	-

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
Total for Annual Forbs		0	0	0	0	0	0	0	0
Total for Perennial Forbs		267	180	262	125	88	125	3.48	8.75
Total for Forbs		267	180	262	125	88	125	3.48	8.75

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 21

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia frigida	41	44	.56	.94
B	Artemisia tridentata vaseyana	17	23	2.44	5.01
B	Cercocarpus ledifolius	6	2	.01	.15
B	Chrysothamnus nauseosus glabratus	34	20	.76	.77
B	Chrysothamnus viscidiflorus viscidiflorus	0	4	-	.15
B	Eriogonum corymbosum	1	1	-	-
B	Gutierrezia sarothrae	57	38	1.14	.42
B	Juniperus osteosperma	0	0	.15	-
B	Juniperus scopulorum	-	-	-	.85
B	Pinus flexilis	-	-	.53	1.38
B	Pinus edulis	0	1	-	-
B	Pinus longaeva	0	0	-	-
B	Pseudotsuga menziesii	-	-	.15	-
B	Symphoricarpos oreophilus	3	2	.15	.45
Total for Browse		159	135	5.91	10.15

CANOPY COVER --
Herd unit 16B, Study no: 21

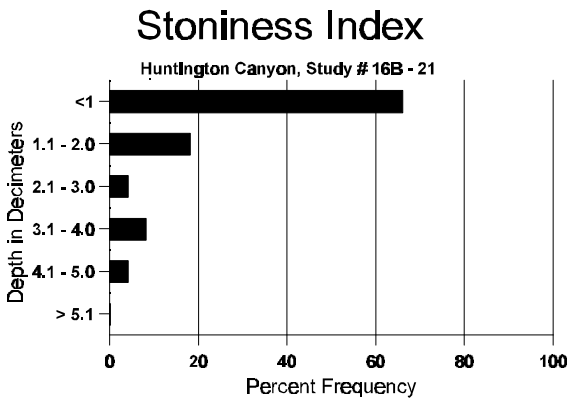
Species	Percent Cover '99
Cercocarpus ledifolius	5
Pinus flexilis	2
Pseudotsuga menziesii	.60

BASIC COVER --
Herd unit 16B, Study no: 21

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	294	306	13.25	20.46	34.86
Rock	346	274	21.75	30.95	18.72
Pavement	338	278	16.50	6.52	14.21
Litter	373	308	23.50	22.46	20.60
Cryptogams	17	8	0	.08	.04
Bare Ground	343	274	25.00	33.02	17.42

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 21, Study Name: Huntington Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.0	48.8 (16.7)	7.5	36.0	25.4	38.6	1.6	2.8	64.0	0.6



PELLET GROUP DATA --
Herd unit 16B, Study no: 21

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	7	7	n/a
Elk	29	24	53 (131)
Deer	4	3	3 (7)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 21

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia frigida																		
S	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	21	-	-	-	-	-	-	-	-	21	-	-	-	420			21
Y	88	20	-	-	-	-	-	-	-	-	20	-	-	-	666			20
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	23	5	-	-	-	-	-	-	-	28	-	-	-	560			28
M	88	13	2	-	-	-	-	-	-	-	15	-	-	-	500	4	6	15
	94	73	11	-	-	-	-	-	-	-	73	-	11	-	1680	6	7	84
	99	68	18	-	1	-	-	-	-	-	87	-	-	-	1740	8	7	87
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	06%	00%	00%	+32%
'94	13%	00%	14%	+25%
'99	20%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1166	Dec:		0%
'94	1720			1%
'99	2300			0%

Artemisia tridentata vaseyana																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	8	-	-	-	-	-	-	-	-	8	-	-	-	266	19	28	8
	94	26	-	-	-	-	-	-	-	-	26	-	-	-	520	10	22	26
	99	16	13	2	-	-	-	-	-	-	31	-	-	-	620	18	28	31
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	6	2	-	-	-	-	-	-	-	7	-	-	1	160			8
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+17%
'94	00%	00%	00%	+32%
'99	41%	05%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	465	Dec:		7%
'94	560			7%
'99	820			20%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
S	88	1	-	1	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	88	1	4	8	-	-	-	-	-	-	13	-	-	-	433			13
	94	3	-	-	1	-	-	-	-	-	4	-	-	-	80			4
	99	-	-	3	-	-	-	-	-	-	3	-	-	-	60			3
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	33	24	4
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	149	121	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	31%	62%	00%	-63%
'94	00%	00%	00%	-50%
'99	00%	75%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	433	Dec:	-
	'94	160		-
	'99	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus glabratus																		
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	20	6	-	-	-	-	-	-	-	26	-	-	-	866	11	13	26
	94	59	-	-	-	-	-	-	-	-	59	-	-	-	1180	41	34	59
	99	25	-	-	-	-	-	-	-	-	25	-	-	-	500	17	20	25
D	88	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	17%	00%	00%	+ 1%
'94	00%	00%	00%	-51%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1166	Dec:	17%
	'94	1180		0%
	'99	580		7%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	16	0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	14	18	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	25%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	160		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum corymbosum																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20	3	14	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	15	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	100%	00%	00%	+50%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	40		-

Gutierrezia sarothrae																		
S	88	21	-	-	-	-	-	-	-	-	21	-	-	-	700			21
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	88	70	-	-	-	-	-	-	-	-	70	-	-	-	2333			70
	94	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
	99	6	2	-	-	-	-	-	-	-	8	-	-	-	160			8
M	88	37	4	1	-	-	-	-	-	-	42	-	-	-	1400	8	7	42
	94	130	-	-	-	-	-	-	-	-	130	-	-	-	2600	6	7	130
	99	81	5	-	-	-	-	-	-	-	86	-	-	-	1720	8	8	86
D	88	3	1	-	-	-	-	-	-	-	3	-	1	-	133			4
	94	11	-	-	-	-	-	-	-	-	4	-	-	7	220			11
	99	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	100			5
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	.86%	.86%	-19%
'94	00%	00%	04%	-38%
'99	07%	00%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	3866	Dec:	3%
	'94	3140		7%
	'99	1960		4%

Juniperus osteosperma																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	33	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

Pinus longaeva																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Symphoricarpos oreophilus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	16	48	3
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40	19	54	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	-50%
'99	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	80		-
	'99	40		-

Trend Study 16B-22-99

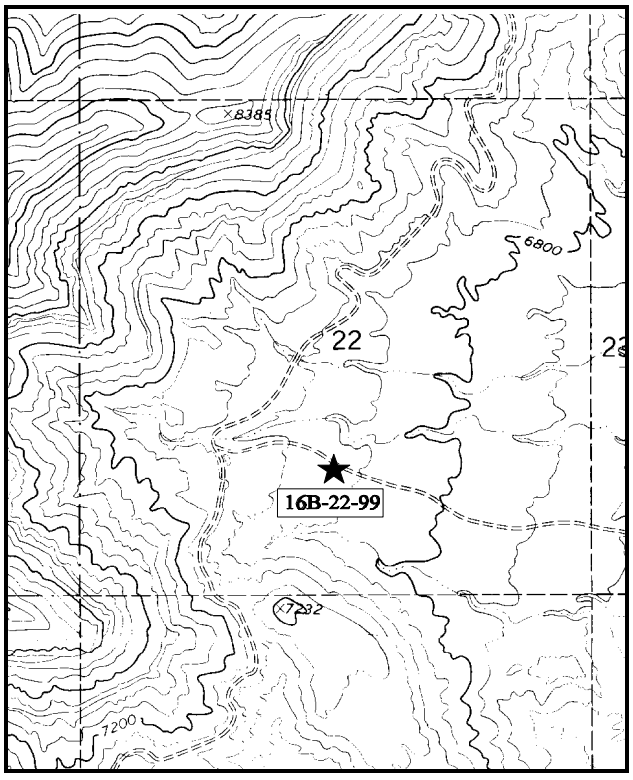
Study site name: Poison Spring Bench . Range type: Chained, Seeded, P-J .

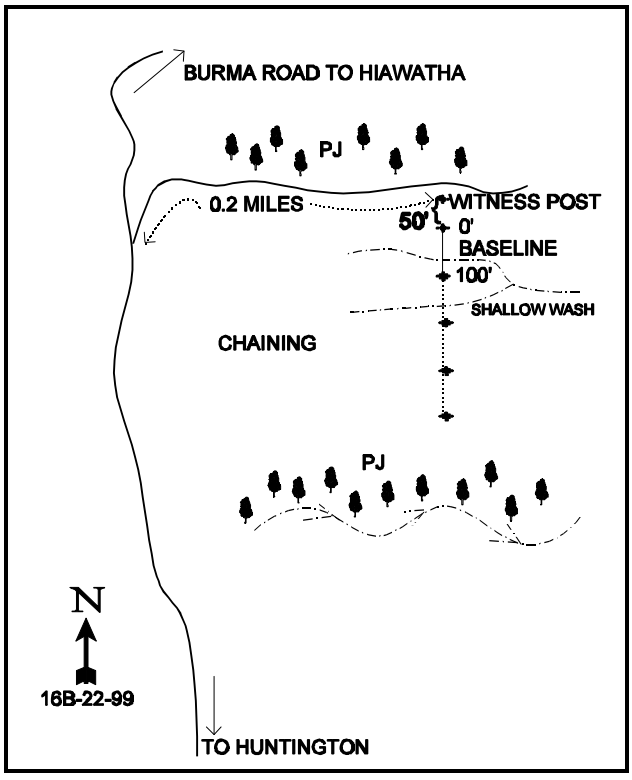
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

To reach Poison Spring Bench, go up the Huntington Canyon Road to the Huntington research farm below the power plant. Across from the farm gate, turn right onto the Burma Road. Follow the Burma Road for 6 miles. Turn right onto a faint road that goes into the chaining below the road. Go down along the edge of the chaining for 0.2 miles to the study witness post. The baseline starts 50 feet south of the witness post, and runs south.





Map Name: Hiawatha Diagrammatic Sketch

Township 16S , Range 8E , Section 22 UTM 4362530.369 N, 498981.103 E

DISCUSSION

Trend Study No. 16B-22 (30-8)

The Poison Spring Bench study is located south of Cedar Creek and southwest of Poison Spring Bench. This trend study is on BLM land. It is part of the North Huntington cattle allotment which is grazed in the spring and fall. The marginal site was chained and seeded in the late 1960's. The area is now dominated by black sagebrush with a large number mostly released pinyon and juniper trees present. The area is considered critical deer winter range, but judging by deer sign there is only light to moderate use. It also receives a small amount of elk use. The 1999 pellet group transect data estimate 13 deer days use/acre (32 ddu/ha), and 8 elk days use/acre (20 edu/ha). Livestock use is light with an estimated 15 cow days use/acre (36 cdu/ha). Elevation at the site is about 6,800 feet. General aspect is to the east, with a gentle slope of 3-5%.

The soil is a gravelly, sandy clay loam with a slightly alkaline pH (7.6). There is a concentration of large rocks, boulders, and pavement on the surface, with a high number of rock in the upper profile. Although there are calcium carbonate (alkali) deposits on the rocks, no hardpan was evident. Soil depth is moderately shallow with an estimated effective rooting depth of just over 12 inches. Phosphorus (4.4 ppm) and potassium (57.6) are both below the level thought necessary for normal plant growth and development (10 ppm and 70 ppm respectively). Some soil erosion is apparent with pedestaling occurring around the base of black sagebrush and small gullies running through the site. However, erosion is not severe and is within acceptable limits for the site.

The site is dominated by browse as these species made up 88% of the total vegetation cover in both 1994 and 1999. Perfectly suited to the dry, rocky country, black sagebrush is the most common browse species. In 1994 and 1999, black sagebrush made up respectively 82% and 74% of the browse cover, and 73% and 65% of the total vegetation cover. The plants are vigorous and show signs of light to moderate hedging. In 1999, 26% of the population was moderately hedged, with only 3% being rated as poor in vigor. Population density was estimated at 15,333 plants/acre in 1988, 78% percent of these were young plants. Seedlings numbered 1,400 plants/acre. During the 1994 reading, 9,740 mostly mature plants/acre were estimated using a much larger sample size. The population was estimated at 11,200 plants/acre in 1999 with vast majority (88%) being mature plants. Recruitment and biotic potential remain low with 80 seedlings/acre and 420 young plants/acre being estimated in 1999. No seedlings were encountered in 1994. Percent decadence decreased in 1999, down to 9% from a high of 15% in 1994.

Other desirable browse species occur on the site in low densities. These include serviceberry, true mountain mahogany, ephedra, and four-wing saltbush. Although heavily browsed, the mature mahogany produces abundant seed. Average height of the bushy shrubs is three feet, but some plants have stems escaping up to six feet in height. Young pinyon and juniper trees that survived the chaining are increasing in size. Current point quarter estimates have pinyon at 103 trees/acre, and juniper at 43 trees/acre. Average stem diameter for pinyon in estimated at 2.1 inches and that of juniper at just over 3 inches.

Overall, herbaceous density and diversity is extremely low. Crested wheatgrass is the most abundant grass on the site. This species has remained at a stable frequency over all sampling years, but plants are small, and produce very little aboveground biomass compared to other chained and seeded sites. This is due to the poor site potential of the area that results from shallow, less fertile soils. All grasses combined provide only 3% cover in 1999, which equates to 10% of the total vegetative cover at the site. Forbs are even less abundant, with all species combined providing less than 1% cover in 1999.

1994 TREND ASSESSMENT

Even through shrubs dominate the site, bare ground cover is still quite low at 22%. It has increased since 1988, but only slightly. There is still abundant litter cover from chaining debris but it is declining. Currently

the soil trend is slightly down. Due to the gentle terrain and protective ground cover, erosion is not a serious problem. However, if the chaining litter is not replaced by herbaceous vegetation the soil trend will continue to decline. There is a variety of palatable browse on the site but only black sagebrush is abundant. Population density of this shrub has declined, but this is primarily because of the sampling design was greatly enlarged. The sampling design now gives significantly better estimates for browse populations that have discontinuous distributions. The biotic and reproductive potentials have declined. Percent decadency has increased but is still low at 15%. Most of these changes would be due to the increased sample size used in 1994. Trend for browse is stable to slightly down. A return to normal precipitation patterns will likely improve the trend. Herbaceous vegetation is seriously lacking on this site. Combined nested frequencies of grasses and forbs sum to only 266. Several forb species encountered in 1988 were not seen in 1994. Trend for herbaceous vegetation is slightly down.

TREND ASSESSMENT
soil - slightly down
browse - stable to slightly declining for black sagebrush
herbaceous understory - slightly down and seriously lacking

1999 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics remain at similar levels to those in 1994. Erosion remains low due to the gentle slope and low precipitation at the site. Trend for browse is stable. The key species, black sagebrush, shows decreased decadency and slightly improved vigor. The population remains stable and use is light to moderate. True mountain mahogany shows improvements in biotic potential and recruitment although density remains relatively low. No plants were classified as decadent in 1999, down from 7% in 1994. Trend for the herbaceous understory is stable, but depleted. The only species that is somewhat abundant is crested wheatgrass, which is low compared to other chained and seeded sites. Sum of nested frequency for perennial grasses and forbs increased in 1999.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable, but depleted

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 22

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron cristatum	172	143	175	72	56	70	2.30	2.82
G	Elymus junceus	-	-	3	-	-	1	-	.15
G	Oryzopsis hymenoides	-	1	-	-	1	-	.00	-
G	Sitanion hystrix	6	11	2	4	4	1	.02	.03
G	Stipa comata	-	3	-	-	1	-	.00	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		178	158	180	76	62	72	2.34	3.00
Total for Grasses		178	158	180	76	62	72	2.34	3.00
F	Arabis spp.	4	12	9	4	5	3	.05	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	‰94	‰99
F	Castilleja spp.	-	-	2	-	-	2	-	.03
F	Cirsium spp.	5	-	-	2	-	-	-	-
F	Cryptantha confertiflora	44	51	46	21	24	22	.56	.28
F	Cruciferae	$_{b}$8	$_{a}$-	$_{a}$-	4	-	-	-	-
F	Descurainia pinnata (a)	-	1	6	-	1	2	.00	.01
F	Eriogonum cernuum (a)	-	5	-	-	2	-	.01	-
F	Ipomopsis aggregata	$_{b}$9	$_{a}$1	$_{ab}$8	8	1	4	.00	.04
F	Lepidium spp. (a)	2	6	-	1	4	-	.04	-
F	Medicago sativa	3	-	3	2	-	1	-	.00
F	Penstemon caespitosus	18	19	29	11	13	15	.11	.09
F	Penstemon spp.	$_{c}$22	$_{a}$-	$_{b}$9	12	-	4	-	.04
F	Salsola iberica (a)	-	$_{b}$13	$_{a}$-	-	5	-	.07	-
F	Schoencrambe linifolia	-	-	2	-	-	1	-	.00
F	Senecio multilobatus	4	-	5	2	-	2	-	.01
Total for Annual Forbs		2	25	6	1	12	2	0.13	0.01
Total for Perennial Forbs		117	83	113	66	43	54	0.73	0.54
Total for Forbs		119	108	119	67	55	56	0.87	0.56

Values with different subscript letters are significantly different at ‰ = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 22

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Amelanchier utahensis	0	0	-	-
B	Artemisia nova	97	98	19.75	19.35
B	Atriplex canescens	0	0	-	-
B	Atriplex confertifolia	0	0	-	-
B	Cercocarpus montanus	10	14	1.14	3.25
B	Chrysothamnus viscidiflorus	0	0	-	-
B	Cowania mexicana stansburiana	0	0	-	-
B	Ephedra viridis	4	7	.18	.00
B	Eriogonum microthecum	13	12	.06	.04
B	Gutierrezia sarothrae	0	4	-	-
B	Juniperus osteosperma	0	3	1.78	2.67
B	Opuntia spp.	5	5	.00	.03
B	Pinus edulis	0	4	1.03	.85
B	Purshia tridentata	1	0	.03	-
Total for Browse		130	147	24.00	26.20

CANOPY COVER --
Herd unit 16B, Study no: 22

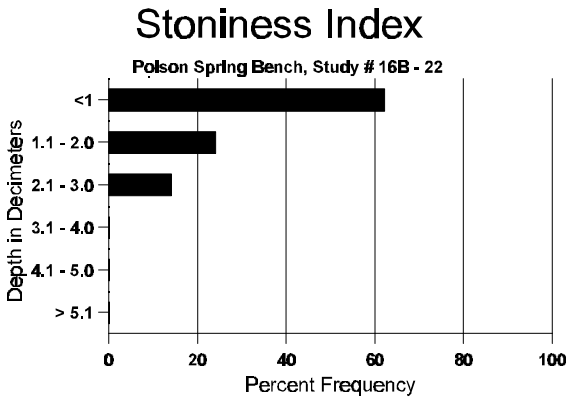
Species	Percent Cover '99
Juniperus osteosperma	1

BASIC COVER --
Herd unit 16B, Study no: 22

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	251	258	6.00	26.07	29.60
Rock	261	193	12.25	9.63	9.84
Pavement	261	248	7.00	4.24	8.36
Litter	386	373	56.75	38.77	41.91
Cryptogams	8	69	0	.01	1.03
Bare Ground	296	281	18.00	22.43	23.83

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 22, Study Name: Poison Spring Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	54.0 (13.6)	7.6	50.7	27.4	21.8	3.9	4.4	57.6	0.8



PELLET GROUP DATA --
Herd unit 16B, Study no: 22

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	26	18	n/a
Elk	7	6	8 (20)
Deer	24	24	13 (32)
Cattle	7	5	15 (37)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 22

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	21	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	88	17	-	-	-	-	-	4	-	-	20	-	1	-	1400			21
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	1	-	-	4	-	-	-	80			4
Y	88	171	5	-	-	-	-	4	-	-	179	-	1	-	12000			180
	94	44	-	-	-	-	-	-	-	-	44	-	-	-	880			44
	99	16	-	-	3	-	-	2	-	-	21	-	-	-	420			21
M	88	22	15	-	-	-	-	1	-	-	38	-	-	-	2533	9	19	38
	94	342	14	2	11	-	-	-	-	-	369	-	-	-	7380	10	27	369
	99	325	125	-	19	5	-	17	-	-	486	-	5	-	9820	9	20	491
D	88	11	1	-	-	-	-	-	-	-	11	-	1	-	800			12
	94	36	31	-	7	-	-	-	-	-	51	-	-	23	1480			74
	99	27	18	-	3	-	-	-	-	-	34	-	-	11	960			48
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	300			15

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	09%	00%	.86%	-36%
'94	09%	.41%	05%	+13%
'99	26%	00%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	15333	Dec:	5%
	'94	9740		15%
	'99	11200		9%

Atriplex canescens

M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	40	37	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	52	41	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Atriplex confertifolia

M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	25	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	9	3	1	1	-	-	-	-	-	14	-	-	-	280	33	38	14
	99	3	-	1	-	1	13	-	-	-	18	-	-	-	360	36	47	18
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	20%	07%	00%	+25%
'99	05%	70%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	300		7%
	'99	400		0%

Chrysothamnus viscidiflorus

Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	0		-
	'99	0		-

Cowania mexicana stansburiana

S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ephedra viridis																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	4	2	-	-	-	-	-	-	6	-	-	2	160	25	32	8
	99	5	4	1	-	-	-	-	-	-	10	-	-	-	200	23	30	10
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	-	-	-	-	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	25%	25%	+47%
'99	33%	07%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		0%
'94	160			0%
'99	300			20%

Eriogonum microthecum																		
S	88	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	88	5	-	-	-	-	-	1	-	-	6	-	-	-	400			6
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
M	88	8	-	-	-	-	-	-	-	-	5	-	3	-	533	3	3	8
	94	22	-	-	4	-	-	-	-	-	26	-	-	-	520	3	6	26
	99	19	-	2	1	-	-	-	-	-	22	-	-	-	440	2	3	22
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	1	-	-	-	-	-	-	-	-	-	3	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	21%	-34%
'94	00%	00%	00%	-13%
'99	00%	11%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	933	Dec:		0%
'94	620			0%
'99	540			11%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	8	0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	4	4	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	120		-

Juniperus osteosperma																		
S	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	60		-

Opuntia spp.																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	5	-	-	-	-	-	-	-	-	5	-	-	-	333	3	4	5
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	4	9	4
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	3	14	4
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-70%
'94	00%	00%	00%	+ 0%
'99	00%	00%	20%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	333	Dec:	0%
	'94	100		0%
	'99	100		20%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	80		-

Purshia tridentata																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	8	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	11	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	0		-

Trend Study 16B-23-99

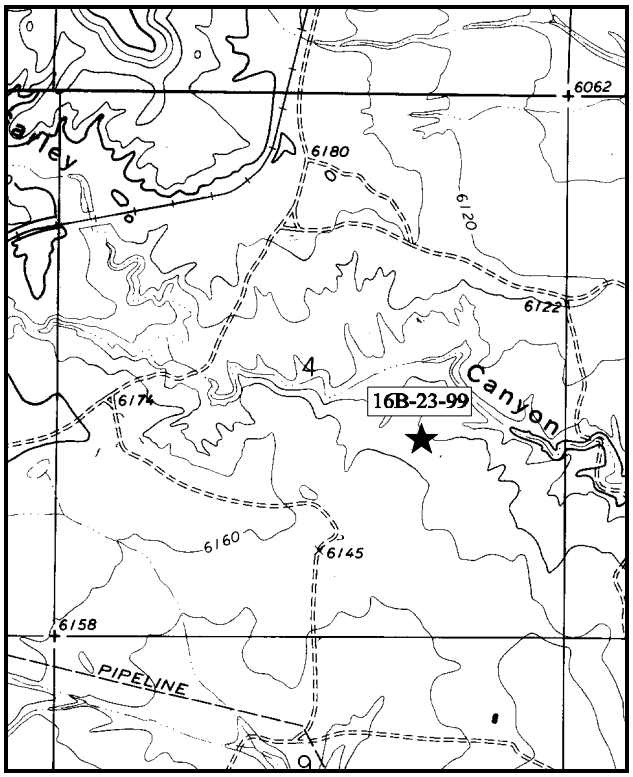
Study site name: Consumer Bench . Range type: Big Sagebrush - Grass .

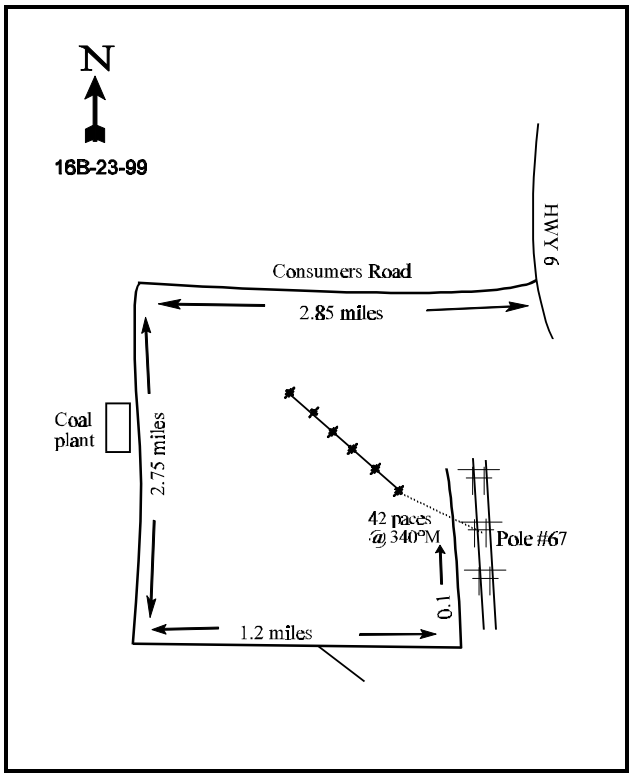
Compass bearing: frequency baseline 328°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

On US 6 south of Helper, turn right (west) on Consumer Road and travel 2.85 miles. Turn left on a dirt road, and go 2.75 miles passing a coal plant. Turn left and travel 0.7 miles to a fork. Stay left for an additional 0.5 miles to another fork. Turn left and go 0.1 miles to a telephone pole (#67). The 0' stake is 42 paces away at 340°M from the telephone pole.





Map Name: Standardville Diagrammatic Sketch

Township 14S , Range 9E , Section 4 UTM 4386343.503 N, 507495.860 E

DISCUSSION

Trend Study No. 16B-23 (30-9)

The Consumer Bench trend study was established on this bench to monitor deer and elk winter range administered by the BLM. The site monitors a Wyoming big sagebrush/grass vegetation type with a few scattered junipers at an elevation of 6,000 feet. The aspect is southwest and the slope is gentle at approximately 5%. The site occurs within the Consumers Wash allotment. The area where the site sits is allotted for 54 sheep from October 1 to April 21, with an additional 821 sheep from April 21 until June 20. Use by wildlife is currently high. Pellet group transect data in 1999 estimate 90 deer days use/acre (223 ddu/ha) and 64 elk days use/acre (159 edu/ha).

The soil is a sandy loam with few rocks on the surface or within the profile. The estimated stoniness index is more a measure of a compacted layer about 12 inches below the surface than the presence of rock. The soil is moderately deep with an estimated effective rooting depth of over 16 inches. The soil has a slightly alkaline pH (7.8), and is low in both phosphorus (3.3 ppm) and potassium (41.6 ppm), which are well below the minimum levels of 10 ppm and 70 ppm determined necessary for normal plant development. Bare ground cover was high at 46% in 1994, but decreased to 36% in 1999. The well dispersed vegetation cover and gentle terrain limit erosion so it is not a serious problem.

The key browse species consists of a moderate stand of Wyoming big sagebrush. The BLM is concerned that the sagebrush in the area is in a state of decline. Currently, the population density is estimated at 4,480 plants/acre, an increase of 15% since 1994. Currently, the population shows a well balanced age class with 55% mature, 27% decadent, and 17% young. Biotic potential is moderate with 300 seedlings/acre being estimated in 1999. This age class structure is nearly identical to that sampled in 1994. Percent decadence is average at 28% in 1994, and 27% in 1999. The proportion of decadent plants classified as dying decreased from 37% in 1994 to 28% in 1999. Utilization was mostly light in 1994, however use has increased to 26% moderate use and 47% heavy use in 1999. Plants with poor vigor were similar between 1994 and 1999, 10% and 11% respectively. There are a high number of dead sagebrush on the site indicating a larger population in the past. Currently, 1 out of every 5 plants is dead. The only other preferred browse on the site consists of a few small winterfat. Snakeweed and prickly pear are the only other abundant browse on the site. Snakeweed is expanding with an 84% increase in 1999, and appears it will continue to increase in the future with half of the population being young.

The herbaceous understory is quite abundant for a Wyoming big sagebrush site. Grasses provide over half of the total vegetation cover in both 1994 and 1999, with nearly all of this coming from perennial species. Six perennial species are present including: blue grama, Salina wildrye, Indian ricegrass, bottlebrush squirreltail, subalpine needlegrass, and needle-and-thread. All perennial grasses increased or remained stable in nested and quadrat frequency except for needle-and-thread which decreased in both. Forbs are diverse but not abundant. Scarlet globemallow is the dominant forb providing 46% of the forb cover in 1999, and occurring in 62% of the sampling quadrats.

1994 APPARENT TREND ASSESSMENT

Average cover of bare ground is high at 45.9%, but due to the gentle terrain and the abundance of herbaceous vegetation, erosion does not seem to be a major problem. The apparent trend for soil is stable. The browse trend is also stable for the time being. The biotic potential (number of seedlings) and reproductive potential (number of young) are sufficient at 7% and 17% respectively to replace dying shrubs on the site. It is apparent by the large number of dead shrubs counted that the population was once larger. Increaser shrubs, broom snakeweed and rabbitbrush are not abundant and do not have age classes of expanding populations. The herbaceous understory is abundant. Perennial forbs are lacking somewhat. Currently, grasses and forbs account for 60% of the vegetation cover. Blue grama, a warm season grass, and needle-and-thread are the dominant grasses on the site.

1999 TREND ASSESSMENT

Trend for soil is slightly improved. Bare ground is still moderately high at 36%, but decreased from 46% in 1994. Vegetation and litter cover both increased in 1999, resulting in better protective ground cover to hold soils in place. The key browse species, Wyoming big sagebrush, shows a stable trend. Age class distribution of the population is nearly identical to the 1994 reading. The proportion of the population classified as decadent, and those showing poor vigor are about the same as 1994 levels. Biotic potential and recruitment remain at moderate levels, currently at 7% and 17% respectively. The only negative aspect with Wyoming big sagebrush is that the level of use has greatly increased. In 1999, 26% of the population displayed moderate use, with an additional 47% showing heavy use. Continued high use could reverse the stability of this species in the future, especially if accompanied by drought. Broom snakeweed is expanding with an 84% increase in density in 1999. Half of the population is young plants which indicates more expansion in the future. The overall trend for browse is stable. The herbaceous understory shows a slightly upward trend. Sum of nested frequency for grasses and forbs increased in 1999. Perennial grasses are the most abundant group in cover and frequency.

TREND ASSESSMENT
soil - slightly improved
browse - stable for the key species Wyoming big sagebrush
herbaceous understory - slightly up

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 23

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Bouteloua gracilis	195	193	55	54	6.22	4.79
G	Elymus salina	86	105	24	32	.95	2.59
G	Oryzopsis hymenoides	114	*159	47	58	2.06	3.80
G	Sitanion hystrix	24	22	10	14	.39	.56
G	Sporobolus cryptandrus	1	-	1	-	.00	-
G	Stipa columbiana	14	*64	5	18	.39	2.44
G	Stipa comata	167	*78	56	26	4.30	1.88
G	Vulpia octoflora (a)	-	6	-	3	-	.01
Total for Annual Grasses		0	6	0	3	0	0.01
Total for Perennial Grasses		601	621	198	202	14.34	16.09
Total for Grasses		601	627	198	205	14.34	16.11
F	Astragalus convallarius	6	*39	2	16	.01	.19
F	Astragalus spp.	7	*-	4	-	.04	-
F	Castilleja linariaefolia	-	*17	-	8	-	.04
F	Calochortus nuttallii	-	*11	-	8	-	.04
F	Comandra pallida	-	*10	-	5	-	.02
F	Collinsia parviflora (a)	17	15	6	6	.06	.25
F	Cymopterus spp.	-	3	-	1	-	.00
F	Descurainia pinnata (a)	3	1	1	1	.00	.01

Type	Species	Nested Frequency '94	'99	Quadrat Frequency '94	'99	Average Cover % '94	'99
F	Eriogonum cernuum (a)	4	-	2	-	.01	-
F	Eriogonum ovalifolium	5	16	3	6	.04	.34
F	Lepidium montanum	12	3	4	2	.21	.01
F	Machaeranthera canescens	1	3	1	1	.00	.03
F	Penstemon linarioides	3	-	1	-	.00	-
F	Penstemon spp.	11	*3	4	1	.02	.03
F	Phlox longifolia	26	*50	9	15	.05	.15
F	Plantago patagonica (a)	3	2	1	2	.00	.01
F	Schoencrambe linifolia	7	*17	3	10	.01	.07
F	Sphaeralcea coccinea	128	166	51	62	.93	1.04
F	Tragopogon dubius	-	2	-	1	-	.00
Total for Annual Forbs		27	18	10	9	0.08	0.26
Total for Perennial Forbs		206	340	82	136	1.33	2.00
Total for Forbs		233	358	92	145	1.41	2.27

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 23

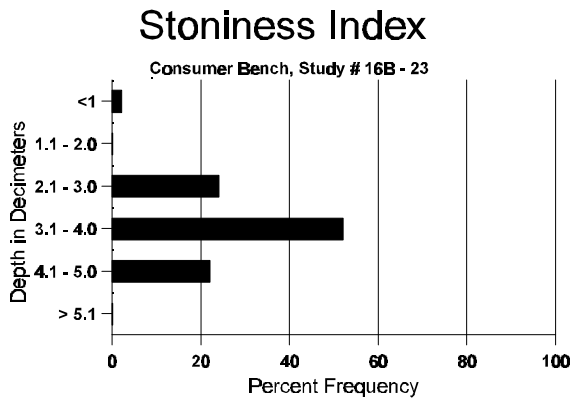
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia tridentata wyomingensis	77	74	9.19	10.31
B	Ceratoides lanata	2	1	-	.00
B	Chrysothamnus viscidiflorus	1	2	-	.15
B	Gutierrezia sarothrae	28	62	.78	.97
B	Opuntia spp.	29	21	.51	.66
B	Pinus edulis	0	1	-	-
Total for Browse		137	161	10.49	12.11

BASIC COVER --
Herd unit 16B, Study no: 23

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	411	423	24.62	32.35
Rock	33	4	.05	.01
Pavement	35	39	.44	.26
Litter	473	470	17.95	24.32
Cryptogams	119	292	1.43	11.09
Bare Ground	457	400	45.88	36.49

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 23, Study Name: Consumer Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.4	56.4 (16.3)	7.8	54.7	27.4	17.8	1.7	3.3	41.6	0.6



PELLET GROUP FREQUENCY --
Herd unit 16B, Study no: 23

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	6	66	n/a
Elk	20	17	64 (158)
Deer	55	58	90 (222)
Cattle	0	0	1 (2)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 23

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	94	3	-	-	10	-	-	-	-	-	13	-	-	-	260			13
	99	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
Y	94	32	1	-	-	-	-	-	-	-	33	-	-	-	660			33
	99	31	2	-	-	6	-	-	-	-	34	-	-	5	780			39
M	94	90	12	-	2	-	-	-	-	-	104	-	-	-	2080	16	26	104
	99	15	36	42	-	5	21	5	-	-	119	4	1	-	2480	17	30	124
D	94	35	15	-	4	-	-	-	-	-	34	-	-	20	1080			54
	99	5	5	18	2	4	25	2	-	-	42	-	2	17	1220			61
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1660			83
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1200			60

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	15%	00%	10%	+15%
'99	26%	47%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	3820	Dec:		28%
'99	4480			27%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	8	3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	4	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-67%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	60	Dec:		-
'99	20			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	7	18	3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	10	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	60	Dec:		-
'99	60			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	111	-	-	-	-	-	-	-	-	111	-	-	-	2220			111
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	160	-	-	-	-	2	-	-	-	162	-	-	-	3240			162
M	94	49	-	-	-	-	-	-	-	-	49	-	-	-	980	8	9	49
	99	159	1	-	-	-	-	-	-	-	159	-	1	-	3200	4	4	160
D	94	-	-	2	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	04%	00%	+84%
'99	.30%	.61%	.30%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	1020	Dec:		4%
'99	6460			0%

Opuntia spp.																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	94	42	-	-	-	-	-	-	-	-	42	-	-	-	840	3	10	42
	99	25	-	-	-	-	-	-	-	-	25	-	-	-	500	3	9	25
D	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	5	-	-	-	-	-	-	-	-	3	-	-	2	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-24%
'99	00%	00%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	920	Dec:		4%
'99	700			14%

Pinus edulis																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	20			-

Trend Study 16B-24-99

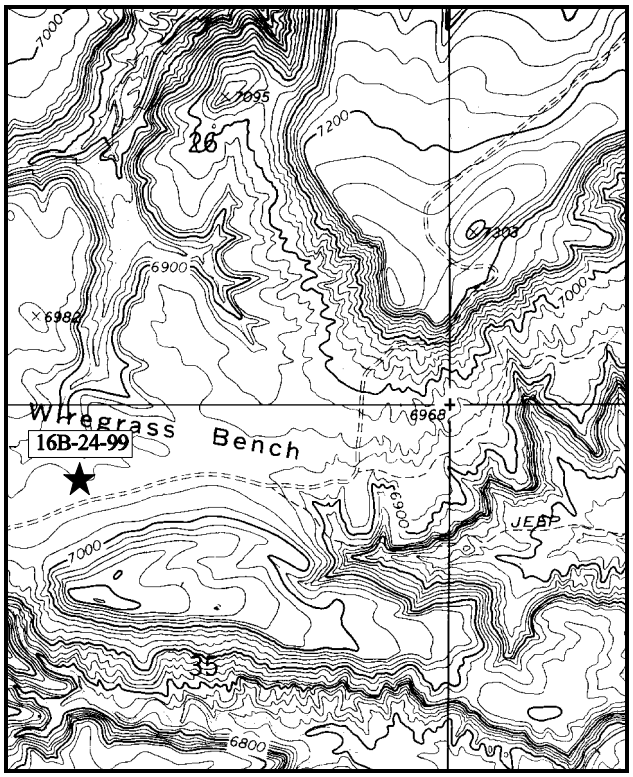
Study site name: Wiregrass Bench . Range type: Big Sagebrush - Grass .

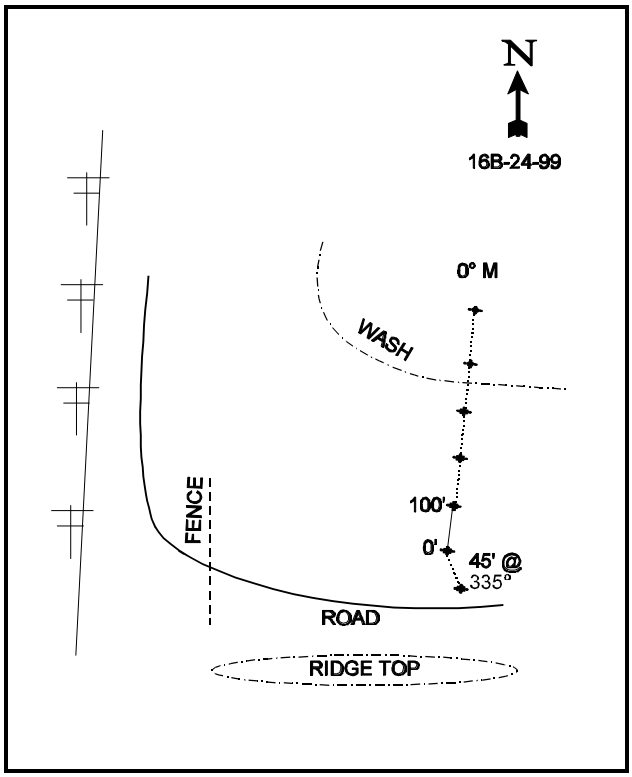
Compass bearing: frequency baseline 0°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take exit 240 on highway 6 in Price just past the hospital. Turn right at the stop sign, continue to another stop sign and turn right again. Stay on this road until you go over a canal, then turn right at the first road on the right. Proceed 6.8 miles to a railroad crossing. From the railroad tracks, travel 4.1 miles. Just before reaching the power lines turn left and travel 0.5 miles along the fence to a "T" in the road. Turn left through a gate and travel 0.3 miles to the witness post on the left. The 0' stake is 9 paces at 330/ M. The baseline runs in the direction of 0°M.





Map Name: Pinnacle Peak

Diagrammatic Sketch

Township 14S , Range 8E , Section 35

UTM 4379739.980 N, 500290.613 E

DISCUSSION

Trend Study No. 16B-24 (30-10)

The Wire Grass Bench was a new study established in 1994 on Wiregrass Bench. It was placed to monitor possible sagebrush die-off on important winter range. The site occurs within the Haley allotment which is grazed from May 16 to October 31 by 27 cattle. Pellet group frequency data from 1994 indicated a high proportion of rabbit and deer use on the site as well as some elk use. Pellet group transect data taken in 1999 estimate moderate use by wildlife with 38 deer days use/acre (93 ddu/ha) and 23 elk days use/acre (56 edu/ha). Livestock use is currently estimated at 15 cow days use/acre (38 cdu/ha).

The site has a west aspect and a gentle slope of 5%. Elevation is 6,900 feet. Soil depth is quite deep with an estimated effective rooting depth of over 20 inches. The soil is slightly alkaline pH (7.6). Rock is fairly uniformly distributed throughout the profile as evidenced by the stoniness index data. Phosphorus levels in the soil (6.8 ppm) are somewhat lower than 10 ppm thought necessary for normal plant growth and development. Percent bare ground is fairly low for a Wyoming big sagebrush site at 32% in both 1994 and 1999.

The key browse species on this site is Wyoming big sagebrush which had a population density of only 1,860 plants/acre in 1994. The population increased between 1994 and 1999, and is currently estimated at 2,380 plants/acre. Age class analysis indicates a continued expansion of Wyoming big sage with increases in biotic potential (1% to 11%) and recruitment (10% to 18%) in 1999. Percent cover for this species nearly doubled in 1999, from 5.5% to 9.7%. Half of the shrubs were decadent (50%) in 1994, with most of the remainder being mature (41%). Percent decadency decreased to 29% in 1999, while the proportion of mature plants increased to 54%. Utilization increased considerably in 1999, with half of the population showing moderate use, and 10% showing heavy use. However, those plants classified as having poor vigor decreased from 14% in 1994 to 4% in 1999. Also, the proportion of decadent plants classified as dying decreased from 26% in 1994, to 12% in 1999. These parameters all indicate an improving trend for Wyoming big sagebrush. The number of dead shrubs to live ones is currently about 1 in 4, another improvement. Some of the mature and decadent plants sampled in 1999 show evidence of insect infestation.

The most numerous shrub on the site is the increaser low rabbitbrush, however it only provided 23% of the browse cover in 1999. This species had a 41% increase in density in 1999, currently estimated at 7,480 plants/acre. Much of this increase is a result of the young age class which increased by over 30-fold between 1994 and 1999. The majority of population is mature plants in both 1994 and 1999. Height and crown for rabbitbrush has greatly decreased in 1999, currently mature plants measure 4 inches by 8 inches. Broom snakeweed is present at the site and shows a stable population of mostly mature plants estimated at 3,260 plants/acre and 3,480 plants/acre in 1994 and 1999 respectively.

The herbaceous understory is very abundant and diverse. Grasses provide 66% and 50% of the total vegetation cover in 1994 and 1999 respectively. Unfortunately, blue grama and Salina wildrye account for the majority of the cover. Blue grama is a warm season grass which provides little forage and increases under excessive spring livestock grazing. This species did significantly decrease in sum of nested frequency in 1999, and it's cover value was less than half that in 1994. Salina wildrye provides poor to fair forage for livestock and big game. This species significantly increased in nested frequency in 1999, and currently provides 27% of the total vegetation cover. Other perennial species include: mutton bluegrass, Indian ricegrass, and bottlebrush squirreltail. Forbs are diverse but not abundant. However, perennial forbs nearly doubled in sum of nested frequency in 1999. A few important perennial species like paint brush, redroot eriogonum and globemallow occur on the site.

1994 APPARENT TREND ASSESSMENT

Ground cover characteristics show adequate cover to control soil erosion. Herbaceous ground cover is high at 25% and litter cover is also high for a Wyoming big sagebrush site at 23%. The apparent browse trend is declining somewhat for Wyoming big sagebrush. Biotic and reproductive potentials are low and the majority of the population is decadent. This is likely caused by a combination of drought and competition from the abundant herbaceous understory and increaser shrubs rabbitbrush and broom snakeweed. The herbaceous understory is abundant and diverse but the composition of grasses is dominated by blue grama and Salina wildrye, both of which offer only fair forage value.

1999 TREND ASSESSMENT

Trend for soil is stable. Percent cover of vegetation, litter and bare ground all stayed nearly the same over the last 5 years. Erosion is not a problem at the site, and herbaceous sum of nested frequency increased in 1999. Trend for the key browse Wyoming big sagebrush is up. Percent decadency decreased from 49% to 29%, the proportion of decadent plants classified as dying decreased from 26% to 12%, and plants showing poor vigor decreased from 14% to 4%. Biotic potential and recruitment both increased in 1999 as well. Improved precipitation patterns in last few years has helped restore vigor and increase the number of seedlings and young. The only negative aspect for this population of Wyoming big sagebrush is that use has increased. Currently, 50% of the population is classified as moderately browsed, up from 16% in 1994. An additional 10% show heavy use. Trend for the herbaceous understory is slightly up. Perennial species dominate the understory. Sum of nested frequency for perennial grasses and forbs increased in 1999.

TREND ASSESSMENT
soil - stable
browse - up for the key species Wyoming big sagebrush
herbaceous understory - slightly up

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 24

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Agropyron spicatum	10	2	3	2	.53	.01
G	Bouteloua gracilis	274	*230	77	72	10.33	4.77
G	Bromus tectorum (a)	5	20	2	6	.01	.20
G	Elymus salina	263	*294	73	84	9.56	8.72
G	Oryzopsis hymenoides	25	19	12	10	.38	.20
G	Poa fendleriana	91	98	23	35	.51	1.27
G	Sitanion hystrix	95	*53	39	20	1.06	1.19
G	Stipa comata	17	*4	6	1	.32	.00
Total for Annual Grasses		5	20	2	6	0.00	0.20
Total for Perennial Grasses		780	700	233	224	22.71	16.18
Total for Grasses		785	720	235	230	22.72	16.38
F	Agoseris glauca	-	*55	-	24	-	.24
F	Alyssum alyssoides (a)	-	*15	-	4	-	.02

Type	Species	Nested Frequency '94	'99	Quadrat Frequency '94	'99	Average Cover % '94	'99
F	Astragalus convallarius	42	38	21	23	.41	.14
F	Astragalus spp.	7	13	2	5	.30	.21
F	Castilleja chromosa	14	*51	6	24	.05	.38
F	Calochortus nuttallii	3	*31	1	14	.00	.07
F	Comandra pallida	35	*69	16	29	.36	.19
F	Collinsia parviflora (a)	21	*27	10	13	.05	.06
F	Crepis acuminata	-	3	-	1	-	.03
F	Cryptantha spp.	2	-	2	-	.01	-
F	Cymopterus spp.	-	*7	-	3	-	.04
F	Delphinium occidentale	-	5	-	1	-	.00
F	Descurainia pinnata (a)	1	-	1	-	.00	-
F	Eriogonum alatum	4	*33	2	17	.03	.16
F	Eriogonum racemosum	44	45	20	23	.39	.32
F	Eriogonum umbellatum	3	1	2	1	.03	.00
F	Hymenoxys acaulis	1	-	1	-	.00	-
F	Lappula occidentalis (a)	-	3	-	1	-	.00
F	Lepidium spp. (a)	18	*-	8	-	.04	-
F	Lesquerella spp.	1	-	1	-	.00	-
F	Machaeranthera grindelioides	8	11	3	5	.06	.10
F	Penstemon caespitosus	5	*20	4	9	.05	.09
F	Penstemon palmeri	3	-	2	-	.01	-
F	Phlox longifolia	43	*74	17	32	.08	.56
F	Plantago patagonica (a)	42	37	14	12	.12	.08
F	Polygonum douglasii (a)	21	*6	9	3	.04	.01
F	Schoencrambe linifolia	14	12	6	5	.03	.02
F	Sphaeralcea coccinea	52	48	21	23	.18	.48
F	Taraxacum officinale	7	12	2	4	.01	.02
F	Zigadenus paniculatus	-	*24	-	13	-	.06
Total for Annual Forbs		103	88	42	33	0.26	0.18
Total for Perennial Forbs		288	552	129	256	2.05	3.16
Total for Forbs		391	640	171	289	2.31	3.35

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 24

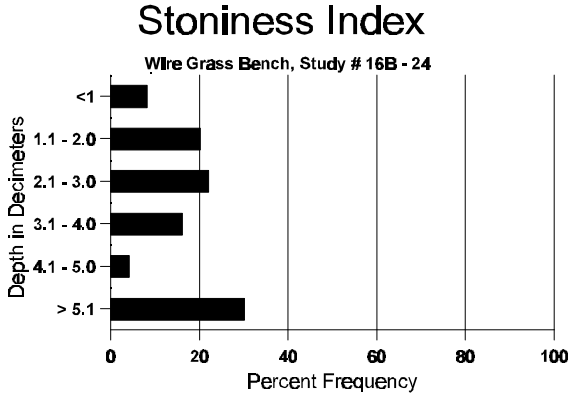
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	2	2	-	-
B	Artemisia tridentata wyomingensis	58	66	5.51	9.74
B	Chrysothamnus viscidiflorus	72	76	2.94	2.96
B	Echinocereus spp.	0	4	-	-
B	Gutierrezia sarothrae	63	34	.61	.18
B	Opuntia spp.	9	3	.01	-
B	Pinus edulis	0	1	.38	.15
Total for Browse		204	186	9.46	13.05

BASIC COVER --
Herd unit 16B, Study no: 24

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	438	433	34.32	32.04
Rock	131	30	1.33	.57
Pavement	118	60	.41	.33
Litter	479	475	23.33	24.23
Cryptogams	231	278	3.75	13.03
Bare Ground	433	384	31.76	32.17

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 24, Study Name: Wire Grass Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
20.2	51.6 (16.8)	7.6	34.7	41.4	23.8	1.7	6.8	121.6	0.6



PELLET GROUP FREQUENCY --
Herd unit 16B, Study no: 24

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	33	56	n/a
Elk	12	5	23 (57)
Deer	36	53	38 (94)
Cattle	6	7	15 (37)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 24

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	94	1	1	-	-	-	-	-	-	-	2	-	-	-	40	17	20	2
	99	-	-	-	-	1	-	-	-	-	1	-	-	-	20	37	42	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	50%	00%	00%	+33%
'99	33%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'94	40		-
	'99	60		-

Artemisia tridentata wyomingensis																		
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	4	-	-	9	-	-	-	-	-	13	-	-	-	260			13
Y	94	7	-	-	2	-	-	-	-	-	9	-	-	-	180			9
	99	17	1	-	2	1	-	-	-	-	21	-	-	-	420			21
M	94	34	5	-	-	-	-	-	-	-	38	1	-	-	780	22	33	39
	99	19	39	5	-	1	-	-	-	-	63	-	1	-	1280	23	34	64
D	94	32	10	1	3	-	-	-	-	-	33	-	1	12	920			46
	99	8	16	5	-	1	2	2	-	-	30	-	-	4	680			34
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	580			29
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	760			38

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	16%	01%	14%	+21%
'99	50%	10%	04%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'94	1880		49%
	'99	2380		29%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	62	2	-	-	-	-	-	-	-	64	-	-	-	1280			64
M	94	212	-	-	6	-	-	-	-	-	218	-	-	-	4360	21	25	218
	99	297	12	1	-	-	-	-	-	-	310	-	-	-	6200	4	8	310
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+41%
'99	04%	.26%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
'94	4400			-
'99	7480			-

Echinocereus spp.																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	1	2	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
'94	0			-
'99	80			-

Gutierrezia sarothrae																		
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	27	-	-	-	-	-	-	-	-	27	-	-	-	540			27
M	94	159	-	-	-	-	-	-	-	-	159	-	-	-	3180	31	6	159
	99	146	-	-	-	-	-	-	-	-	146	-	-	-	2920	3	4	146
D	94	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	.61%	+ 6%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
'94	3260			1%
'99	3480			1%

Opuntia spp.																		
M	94	10	-	-	3	-	-	-	-	-	13	-	-	-	260	3	7	13
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	2	5	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-69%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
'94	260			-
'99	80			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'94	0	Dec:	-
	'99	20		-

SUMMARY

WILDLIFE MANAGEMENT UNIT 16B - MANTI-NEBO, MANTI NORTH

The twelve range trend studies on the old NE Manti unit focus on two different types of key areas related to the big game species involved. Three studies were established to monitor key elk winter range; Ford Ridge (#15), Hardscrabble (#16) and Huntington Canyon (#21). The other studies are on ranges critical to deer, although many receive elk use. Most of the sites on the unit sample sagebrush-grass ranges. The Poison Spring Bench study (#22) is located in a pinyon-juniper chaining and Huntington Canyon samples a perennial grass range. Two studies established in 1994 at Consumer Bench (#23) and Wiregrass Bench (#24) were placed to monitor possible Wyoming big sagebrush die-off on important winter ranges for deer. The Starvation Mahogany (#8) and Starvation Mountain Brush (#9) sites were established on Division property in 1989 to monitor use by elk and mule deer, especially winter use.

The higher elevation site at Ford Ridge shows downward trends for soil and browse, with a slightly upward trend for the herbaceous component. This site will be dropped due to lack of use by elk, the primary reason the site was established. Two other high elevation sites at Hardscrabble and Huntington Canyon that were established to monitor elk use, currently show stable or upward trends in all categories. The chained pinyon-juniper site at Poison Spring Bench shows stable trends in soil, browse and herbaceous understory. The mountain big sagebrush/black sagebrush site at Telephone Bench has stable soil and herbaceous understory trends, with an improved browse trend. The other sagebrush-grass sites at Slackpile, Porphyry Bench, North Spring Bench, Consumer Bench, and Wiregrass Bench, all have improving or stable soil trends. Browse trends are stable at Porphyry Bench, North Spring Bench, and Consumer Bench, upward at Wiregrass Bench, and down at Slackpile. The herbaceous understory shows stable to upward trends on all of these sagebrush-grass winter range sites. The mahogany and mountain brush sites in the Starvation drainage show stable browse trends at the present time. Soil trend is stable at Starvation Mahogany, but down at Starvation Mountain Brush, with herbaceous trends stable or up at both sites.

This unit shows increasing deer use on the Wyoming big sagebrush sites at the lower elevations. Use in 1999 was moderate to heavy on these areas, ranging from 38 deer days use/acre at Wiregrass Bench to 159 deer days use/acre at North Spring Bench. With better precipitation patterns in recent years, the browse trends are stable to up at these sites. However, continued heavy wildlife use on these critical sagebrush ranges could result in the reversal of these improving trends, especially if associated with extended drought.

Site	Category	1989	1999
16B-8 Starvation Mahogany	soil	est	0
	browse	est	0
	herbaceous understory	est	0
16B-9 Starvation Mountain Brush	soil	est	-
	browse	est	0
	herbaceous understory	est	+
Site	Category	1994	1999
16B-15 Ford Ridge	soil	0	-
	browse	0	-
	herbaceous understory	-	+

Site	Category	1994	1999
16B-16 Hardscrabble	soil	-	+
	browse	0	+
	herbaceous understory	-	+
16B-17 Slackpile	soil	+	0
	browse	-	-
	herbaceous understory	0	0
16B-18 Porphyry Bench	soil	+	0
	browse	0	0
	herbaceous understory	+	0
16B-19 North Spring Bench	soil	+	+
	browse	-	0
	herbaceous understory	-	0
16B-20 Telephone Bench	soil	0	0
	browse	-	+
	herbaceous understory	0	0
16B-21 Huntington Canyon	soil	0	0
	browse	0	0
	herbaceous understory	0	0
16B-22 Poison Spring Bench	soil	-	0
	browse	0/-	0
	herbaceous understory	-	0
16B-23 Consumer Bench	soil	est	+
	browse	est	0
	herbaceous understory	est	+
16B-24 Wiregrass Bench	soil	est	0
	browse	est	+
	herbaceous understory	est	+

(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward, (0/+) = stable to slightly upward, (est) = trend study established